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9 October 1980

# Worldwide Report

TELECOMMUNICATIONS POLICY,  
RESEARCH AND DEVELOPMENT

No. 134

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9 October 1980

# WORLDWIDE REPORT

## TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

No. 134

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## WORLDWIDE AFFAIRS

### BRIEFS

DPRK-PRC BROADCASTING AGREEMENT--Beijing, September 25 (KCNA)--An agreement on cooperation in radio and television broadcasting between the Radio and Television Broadcasting Committee of the DPRK and the Chinese Central Broadcasting Administration was signed in Beijing on September 25. The agreement was signed on our side by Kim Si-hak, chairman of the Radio and Television Broadcasting Committee of the DPRK, and on the opposite side by Zhang Xiangshan, director of the Chinese Central Broadcasting Administration. [Text] [SK262257 Pyongyang KCNA in English 2203 GMT 26 Sep 80]

TELEX WITH ALASKA, LIBERIA--Kuala Lumpur, 29 Sep (AFP)--Malaysia will have direct automatic telex links with Alaska and Liberia from Wednesday [1 October], according to a statement from the Energy, Telecommunications and Posts Ministry today. [Text] [BK300525 Hong Kong AFP in English 1335 GMT 29 Sep 80]

DPRK, SEYCHELLES SIGN ACCORDS--Pyongyang September 23 (KCNA)--An agreement on news exchange and cooperation between the Korean Central News Agency and the Seychelles News Agency and an agreement on cooperation in radio and television broadcasting between the Radio and Television Broadcasting Committee of the DPRK and the Ministry for Education and Information of the Republic of Seychelles were signed in Pyongyang on September 22. The agreements were respectively signed on our side by personages concerned Kim Song-kol and Han Kwang-hak and on the opposite side by James Michel. [Text] [SK230409 Pyongyang KCNA in English 0403 GMT 23 Sep 80]

TURKEY, PRC TELEX COMMUNICATIONS--Ankara, September 26 (XINHUA)--Turkey yesterday started its fully automatic telex communications with China and several other countries, according to a statement issued here today by the Turkish Communication Ministry. Among the countries that were newly linked to Turkey were three Asian countries, five African countries and two Latin American countries. Turkey already had telex communications with the United States and several European and Middle East countries. [Text] [OW261522 Beijing XINHUA in English 1507 GMT 26 Sep 80]

'SLBC' AID FROM 'DEUTSCHE WELLE'-- Under an agreement signed between the Sri Lanka Broadcasting Corporation [SLBC] and DEUTSCHE WELLE, the Federal Republic of Germany has set aside a sum of approximately 12,000,000 German marks for the development of radio broadcasting in Sri Lanka. The extensive project will cover the construction of new stations, including 13 new transmitters, in Kantalai, Ambawela, Mahiyangana, Ratnapura and Kirimediya and the extension of stations in Jaffna, Mannar, Amparai, Kandy, Maho and Weeraketiya. In addition technical personnel from the SLBC will be sent to Germany for training. [Text] [8K290623 Colombo SUN in English 17 Sep 80 p 1]

CSO: 5500

## INTER-ASIAN AFFAIRS

### ASIAN TELECOMMUNICATIONS NETWORK BEING SET UP

Calcutta THE STATESMAN in English 25 Jul 80 p 9

[Text] New Delhi, July 23--An Asian telecommunication network is being set up for implementation of schemes of regional links and upgrading of domestic routes. The network, when completed, will link ASEAN countries with Turkey through India, Pakistan and Iran utilizing various methods of transmission such as submarine cable, microwave radio relay, coaxial and satellite links.

Even after establishment of the network, which is being set up under the aegis of the Economic and Social Commission for Asia and the Pacific and the International Telecommunication Union, some countries, such as Burma, will have to be brought into the regional network.

This new step has been made possible following the establishment of the Asia Pacific Telecommunity under ESCAP in May 1979. The International Telecommunication Union, a U.N. agency, and an apex body on international regulations on telecommunications, provides for the formation of regional organizations of this kind. The Asia Pacific Telecommunity, which has 17 members, including India, is on the lines of the European Conference of Posts and Telecommunications, Arab Telecommunication Union, and the African and Malagasay Postal and Telecommunication Union.

The objectives of the telecommunity are broadly to correlate planning and development programmes within the region to meet future requirements and to strengthen the regional telecommunication network.

The Asia Pacific Telecommunity, which will work closely with the ITU, UNDP and ESCAP, will review the progress of the Asian telecommunication network. The general idea is to improve telecommunication so that the countries of the region could come closer.

One of the functions of APT is to provide technical cooperation on a regional basis to help the growth of telecommunication among the member countries. In this context, India, with its own programme for domestic telecommunication via INSAT satellite, will provide communication links

between the remotest corners of the country and the major centres of the Asia Pacific region.

This year's programme of the Asia Pacific Telecommunity includes collection of data on national networks on such aspects as quality of service, present status and future programme of development of rural and remote areas and new telecommunication technologies.

CSO: 5500

## COMSAT APPLE REPORTED ON PAR WITH INTELSAT

Madras THE HINDU in English 19 Jul 80 p 8

[Article by N. S. Sachitanand: "Comsat: India's Proven Capability"]

[Text]

**T**HERE are satellites and satellites. There are the simple ones which just go round and round the earth and say "beep" to inform their makers that they are hale and hearty. There are the prying ones which use infra-red scanners and high resolution telescopes to see what you are doing in your backyard. Then the meteorstats keep a "weather" eye on the goings on in the earth's atmosphere and feed you with those swirls studded cloud photographs. The lazy ones are content to drift around the earth and bounce back signals sent to them. There are the "scientists" who peer at the far heavens through X-ray eyes. The latest addition are the "killers" which keep taking pot shots at the nosey ones with high-powered laser beams.

And then there is the 'Comsat'—a space age neologism for communication satellite—a device that has revolutionised long distance communications broadcasting and data transfer, a technology that has made the world shrink drastically, a means by which you can talk to your cousin in New York over the phone with much greater clarity than you can to your neighbour next door.

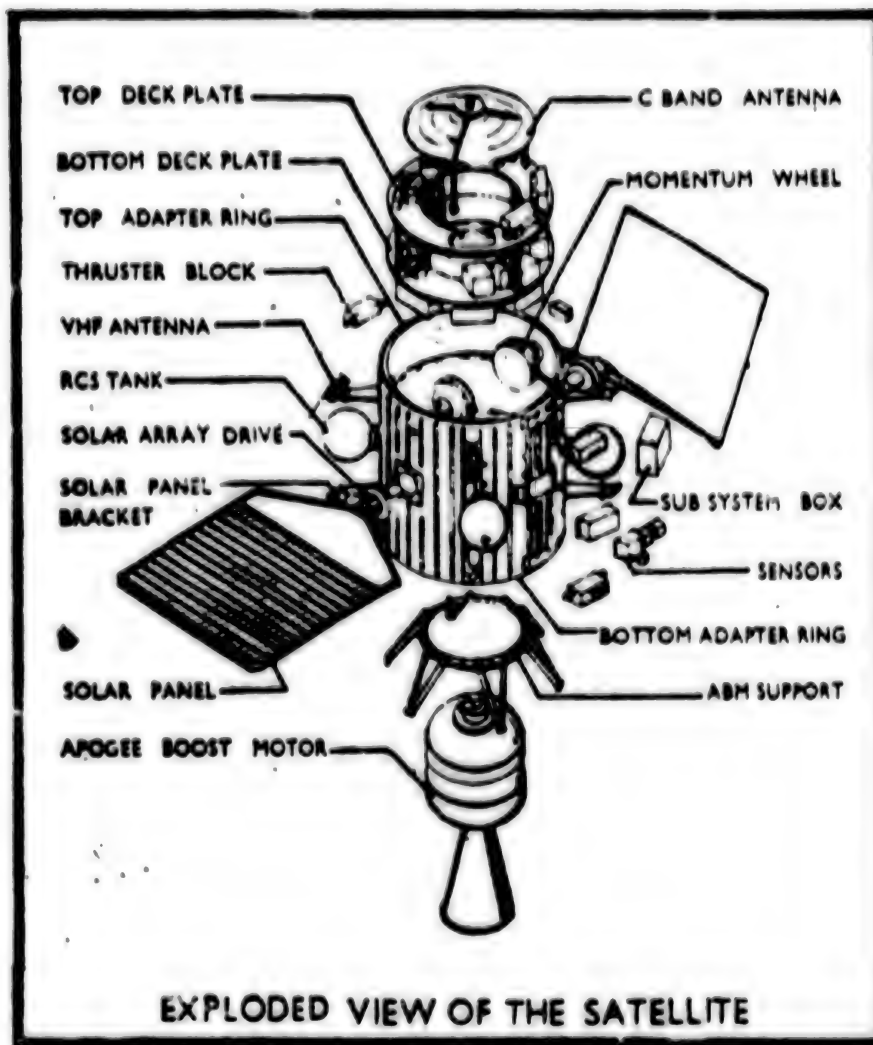
Among the satellite types, the Comsat is one of the most complex and difficult to make and put to use, since it carries its own propulsion system and has to be subjected to a series of deployments in orbit. As of today, only the U.S., USSR and a combined Franco-German team have shown the capability of conceiving, designing and making their own comsats. It is indeed

remarkable that Indian space scientists have, within only five years of launching the first indigenously made satellite (the Aryabhata), prepared for launch a comsat designed and made in India.

What is even more striking is that this comsat code named APPLE (an acronym for Ariane Passenger Payload Experiment) is practically on par in technological complexity with the U.S.-made INTELSAT series of comsats now in commercial use for international civilian communications (though, of course, the size and capacity are much lower. Like the INTELSATs, the APPLE is a three-axis body-stabilised, geo-stationary communication satellite with its own apogee propulsion, altitude and orbit control systems.

The comsat is in essence a communications relay station in space. It has a device called a transponder on board which receives messages from earth stations, amplifies them and reroutes them back to the receiving earth stations. Since the satellite weight has to be as low as possible, the transponder cannot have a very high power rating. Therefore, to ensure that the radiated power of the on-board transponder is put to the best use, the satellite has to be "fixed" in space in such a way that the radiated beam from its communications antenna remains concentrated on the area the satellite is supposed to serve.

This "fixing" of the satellite in space is done in two ways. First it is put in what is known as a geostationary orbit, that is an orbit such that the speed of revolution of the satellite



around the earth is equal to the speed of rotation of the earth itself. This keeps the satellite "hovering" always over the same spot on earth. Such a geostationary orbit is achieved when the satellite is put into an equatorial orbit at about 36,000 km. above the earth's surface.

Since it will require an enormous amount of rocket power to shoot a satellite straight off into such a high orbit, a launch vehicle is used to first place the satellite into a highly elliptical transfer or parking orbit.

In the case of the APPLE, the launch vehicle will be the Ariane, developed by the European Space Agency. The Indian satellite will be riding as a central passenger between the CAT

module at the bottom and the METEOSAT satellite at the top, both of which belong to the ESA. The cylindrical configuration of the APPLE and the extra strengthening of its wall have been dictated mainly by the need to support the METEOSAT and by the dynamic envelope of the Ariane shroud.

The three satellites in one payload will be launched from Kourou in French Guiana. The previous launch date was September 1980, but due to some problems creeping in the Ariane, the launch has been postponed to early 1981. The composite payload will be launched into a transfer orbit of 200 by 35,786 km. at 20° West longitude over the equator with an inclination of 10.5°.

Once the APPLE is in the nominal synchronous transfer orbit the real task will be to get it into a geostationary or quasi-geostationary orbit. For this, the spacecraft will be first spun up to 60 rpm by means of firing thrusters using liquid hydrazine as propellant, which is stored in spherical titanium tanks. This spin is given to orient the satellite along an axis that is convenient to push it into the final geostationary orbit by firing the Apogee Boost Motor (ABM) that is fixed to one end of the satellite.

In the case of the APPLE, the ABM is a solid propellant rocket motor with an incremental velocity of 1882 m/sec developed at the Vikram Sarabhai Space Centre, Thumba. The timing of the firing of the ABM is very critical. It has to be fired when the satellite is just at the apogee of its transfer orbit.

After the manoeuvre has been planned in a geostationary orbit another series of manoeuvres is performed to orient it in such a way that its communications antenna points directly at the geographical area on earth the satellite is supposed to serve. For achieving this, the APPLE will be first de spun by firing the hydrazine thrusters in the reverse direction. The spin rate will be brought down to 10 rpm and the spin axis will be brought perpendicular to the sun line.

The spin rate will be further reduced to 0.5 rpm and the wing-like solar panels which are kept folded during launch, will be deployed. (The two panels of the APPLE, which are rectangular sheets of silicon photovoltaic cells, convert incident sunlight into electricity and can yield 241 watts at the beginning of their life and 100 watts at the end). Once the solar panels are spread out, a sun tracking sensor will feed signals to a stepper motor fed by a 300 watt-hour nickel-cadmium storage battery and the motor will orient the panels normal to the sun.

The next step is for the satellite to lock on to the earth—what is known as 'earth acquisition.' For this a special 'Earth Sensor' obtains the position of the earth with respect to the satellite by picking up the earth's luminous signals from the Earth Sensor are fed back to a device called the Momentum Wheel whose acceleration or deceleration alters the orientation of the satellite's pitch axis. The orientation of the other two axes—yaw and roll—are controlled by the hydrazine thrusters.

The 'altitude' of the satellite is controlled by the three-axis body stabilisation in such a way that the satellite is in the normal mode, that is, it keeps pointing directly at the Indian subcontinent. During the two years designed life of APPLE, the altitude control system described above will keep the satellite on its station (102° E longitude) within  $\pm 0.1^\circ$  inclination and East-West drift. Once the satellite is in position, its testing and use can begin.

The easier way to make a satellite like the APPLE is to import all the subsystems and just fit them together in the country. The tougher but more beneficial method in the long run is to develop indigenous technology to make the subsystems. Once the know-how and infrastructure are developed within the country making the next generation of bigger applications satellites is far easier. There is also the advantage of cost. Since most of the subsystems are custom-made foreign suppliers will charge fancy prices. For example, an earth sensor made indigenously may cost around Rs. 10 lakhs to Rs. 15 lakhs, whereas if it is bought abroad, it might be priced over Rs. 50 lakhs.

Then again, by designing and making the subsystems within the country, our engineers and scientists gain tremendous confidence in handling them and in troubleshooting when problems with them occur.

One must not also forget the untold benefits that accrue to other sectors of industry from developing technology for spacecraft. For these and other good reasons, the Indian Space Research Organisation chose the second method for making APPLE.

Some of the technological firms (for the country) associated with the making of the APPLE are:

- (1) Heavy magnesium castings by DMRL, Hyderabad.
- (2) Gold plating of magnesium by NAL, Bangalore.
- (3) Manufacture of aluminium honeycomb deck plates of space quality by IAL, Nasik.
- (4) Apogee Boost Motor, Hydrazine Reaction Control System, Momentum Wheel, Honeycomb structured C Band antenna of carbon fibre reinforced plastic, automatic spring loaded solar array deployment mechanism—all from VSC, Thumba.



(5) C-Band transponder by SAC Ahmedabad.

(6) Printed circuit boards with line thickness of 1.52 by BEL and Meqar & Guler, Bangalore.

(7) Thermal points and optical view reflector by ISAC, Bangalore.

(8) Earth sensor by ISAC, Bangalore.

Besides the development of the above items, the making of APPLE also involved the setting up of entirely new facilities for spacecraft testing such as a four metre dia thermovac at ISAC in which the vacuum and temperature conditions of deep space are simulated, a test facility at BHAR which was used to test the firing of the Apogee Boost Motor under high vacuum conditions, a dynamic balance table at ISAC which was used to check the balance of the satellite under spin and incorporated an electronic auto-calibrator to show deviations as small as 0.01°, an accelerated life test chamber at ISAC in which ultra-high vacuums are created by means of turbomolecular pumps, a static earth sensor test facility at ISAC and many other speciality devices.

Of course not all the components of APPLE would be made within the country due to lack of time for developing the needed technology. Thus items like solar panels, storage battery, travelling wave tube, titanium storage vessel for hydrazine and others had to be imported. But the technology for many of these is being developed in India and will be available for the next satellite.

The APPLE is not a commercial comet like the INTELSATs. Its main mission goals, as the project manager, Mr. R. M. Vasagam, points out, are to gain indigenous capability in the design, development, fabrication, test, evaluation, injection into geostationary orbit, in-orbit management and utilization of geostationary communication satellites. The satellite has only one transponder (with a fully redundant backup) with a capacity for accommodating 200 two-way voice channels.

A number of telecommunications experiments are planned with the APPLE spacecraft in which the C-Band earth stations at Delhi, Madras and Ahmedabad and the transportable remote area as well as low cost terminals will be participating. The experiments will not be confined to telephony but also to radio and TV broadcasts and data transmission.

During the transfer orbit and three-axis stabilisation manoeuvres, the INRO Tracking and Command Network (ISTRAC) will be responsible for tracking, telemetry and telecommand with backup from earth stations at SAC, Ahmedabad, Kourou (French Guiana), Carnarvon (N.W. Australia), Maunabo (Hawaii), La Reunion (Indian Ocean) and a mobile earth station at Suva (Fiji). All mission operations will be controlled from the APPLE Mission Control Centre at Sriharikota. Once the spacecraft becomes operational, ISTRAC will be responsible for on-orbit control of the spacecraft.

## MANAGER TELLS LUCKNOW EARTH STATION PLANS

New Delhi PATRIOT in English 23 Jul 80 p 2

[Text]

LUCKNOW, July 22 (PTI)—An earth satellite station for providing modern and sophisticated trunk linkage between Lucknow and other important centres such as Delhi, Bombay, Calcutta and Madras and remote areas of the country like Car Nicobar, Lakshadweep, Aizawl and Leh is being set up at Mahmudabad in Mirzapur district.

The District Manager, Lucknow Telephones, Mr G K Gupta said the "earth station" would work with the new satellite "INSAT" to be launched for multi-purpose utilisation such as domestic communication, TV transmission and meteorological data.

Mr Gupta told newsmen here on Monday the trunk circuits from the "earth station" being set up at Mahmudabad, would be terminated in a new telecommunication complex proposed to be

located in the central place of Lucknow.

Thus Lucknow would have the privilege of being one of the few state capitals in the country to be connected with modern media of communication in about two years period, Mr Gupta added.

A concentrator type radio system is also proposed to be installed here to enable reliable media of communication between the State capital and the long distance public telephones and small auto exchanges located in the Lucknow revenue district.

The field trial of such a system would be carried out shortly in the country and the timeframe of its inception at Lucknow would depend on the results of the field trials, Mr Gupta said.

CSG: 5300

## THREE NEW RADIO STATIONS PLANNED FOR ANDHRA PRADESH

New Delhi PATRIOT in English 16 Jul 80 p 5

[Text]

HYDERABAD, July 15 (PTI) — The Union Ministry of Information and Broadcasting has included three new radio stations and one TV relay transmitter in Andhra Pradesh in the Sixth Plan.

Union Minister of State for Information and Broadcasting Ram Dulai Sinha told PTI in an interview today that three new radio stations — Warangal, Tirumati and Rajahmundry — were included in the Sixth Plan besides a local level pilot station at Adushad.

A Rs 40.00 lakh permanent studio would be set up for Candapah whose transmitter was proposed to be upgraded from 20 KW to 100 KW. A suitable site for the studio was already selected and acquired.

The setting up of a relay transmitter at Vijaywada to replay the programmes of Hyderabad television was one of the approved projects in the Sixth Plan, Mrs Sinha said.

A site on Kondapally hill, 20 KM from Vijaywada had been selected due to its natural elevation. The Ministry for Information and Broadcasting had approached the State Government for providing basic amenities free of cost as promised by

the Chief Minister.

It was proposed to have a 10 KW transmitter with 150 m high tower. The radial service range of the transmitter was expected to be 110 kms covering 2,956 villages spread over an area of 36,000 kms. Total population expected to be covered was 60.53 lakhs comprising 16.50 lakh urban and 44.03 lakh rural population.

Mrs Sinha said the proposed permanent studio type I for Visakhapatnam was expected to be completed in the year 1982-83.

The proposed television studio will have built in provision for adding one more studio subsequently. The civil construction wing was entrusted with the task of developing the building plans, she added.

Referring to general complaints about the quality of programmes presented by the Doordarshan and All India Radio, Hyderabad, she said steps would be taken to improve the quality of the programmes.

She assured that suggestions for introduction of TV programmes for the entertainment of urban elite news bulletin on TV and inclusion of Urdu programmes would be considered.

## GOVERNMENT PLANS PARTIAL SWITCHOVER TO COLOUR TV

New Delhi PATRIOT in English 16 Jul 80 p 5

[Text]

**T**HE Government envisages a two-phased programme for a partial switchover to an era of colour television in the country, reports UNI.

An official note says. It is proposed to provide for the transmission of films and ENG/EFP (colour codes) programmes in colour at the existing television centres in the first phase. The next phase would see one of the television studios being equipped for transmission of studio programmes in colour. The rest of the transmissions will continue in black and white for some time to come.

According to the official document, television centres along the border areas will receive priority in the matter of colour television.

The two-phased programme is estimated to cost Rs 34.30 crores.

The document says a considerable part of the transmission equipment available with the Doordarshan is colour-compatible. Only minor additions will be needed to enable this equipment to carry transmission in colour. The micro-wave links between Delhi, Bombay and Madras, Delhi, Jullundur and Srinagar and Delhi and Calcutta will also enable the relay of colour television programmes with minor modifications.

The programme production equipment in the studios will,

however, have to be largely replaced by colour cameras and associated control and monitoring equipment.

Stressing the need for colour television in the country, the note says advantages of colour television over black and white in communicating information, entertainment and education have already led many developing countries to opt for colour television.

Phasing-out of black and white television equipment, availability of only colour equipment in world markets and research and development work being done only for colour systems are some of the other important factors driving home the need for the change over to colour television.

Moreover, the exchange of television programmes with other countries can take place only if India's television programmes are in colour. Tremendous advances have been made in other countries in the production of feature films and documentaries in colour with social themes.

Optimum utilisation of this material for the Indian television network is possible only if the transmission is changed over to colour.

According to the document, introduction of colour television is also expected to increase the advertisement revenue of Doordarshan as advertisements have more impact when telecast in colour.

## BRIEFS

TELEVISION PLANS DISCUSSED--Madras, July 16.--A television relay centre, proposed to be set up at Kodaikanal is expected to be commissioned by 1982-83 and will help viewers in all the southern districts of the State from Thanjavur to Kanyakumari to pick up the programmes relayed from Madras. Giving this information here on Wednesday, the Union Minister of State for Information and Broadcasting, Mrs Ram Dulari Sinha, told newsmen that the teething troubles over acquisition of a site at Kodaikanal had been overcome with the State Government gifting the necessary land. Mrs Sinha said the site for the TV studio proposed in Trivandrum had been acquired. A transmitter had also been ordered and the project was expected to be completed by 1982-83. However, the scheme for Bangalore had not made any progress as no suitable site had been chosen yet. The Minister met the media officials in the city and discussed their problems including the sanction of adequate staff and construction of more quarters. [Text] [Madras THE HINDU in English 17 Jul 80 p 9]

TELEVISION RELAY STATIONS--Bhopal, July 19: The minister for information and broadcasting, Mr V. P. Sathe, told newsmen today that ten towns, including Bhopal, Indore and Gwalior, would be covered through relay stations on the microwave network in the first phase of the T.V. expansion programme. Though he could not say how long it would take to complete the programme, Mr Sathe said the feasibility of the project had been established. He added that limited financial resources were a major constraint in the early implementation of the programme. Mr Sathe deplored the "wire coverage" given in the press to incidents of rape, particularly those involving policemen. He expressed the view that these incidents were receiving "disproportionate" publicity. Referring to the developments in Assam, Mr Sathe said the people failed to appreciate fully the threat posed to the integrity of the nation. [Text] [Bombay THE TIMES OF INDIA in English 20 Jul 80 p 3]

CSO: 5500

HYDERABAD TELEVISION STATION--The Doordarshan Kendra at Hyderabad is to be upgraded with a permanent studio and relay transmission facilities during the sixth Plan period (1980-85), reports UNI. The Kendra has a ten Kilowatt television transmitter set up under the SITE continuity programme in 1977. It already had a Base Production Centre for feeding programmes to the satellite during the ISTE experiment conducted during 1975-76. [Text] [New Delhi PATRIOT in English 11 Aug 80 p 8]

LOW-POWERED TRANSMITTERS DISTRIBUTED--The All India Radio has worked out a plan to provide 353 low-powered transmitters for each district in the country, reports UNI. Frequencies have been coordinated as part of this plan worked out under the aegis of the International Telecommunication Union. An official note says the implementation of this scheme would, however, depend on the availability of financial resources and relative priorities. [Text] [New Delhi PATRIOT in English 11 Aug 80 p 8]

IMPROVED COMMUNICATIONS WITH NONALIGNED--The government proposes to set up satellite and ground links with 11 world capitals to improve communication facilities in the nonaligned countries. This was stated by Information and Broadcasting Minister Vasant Sathe when he met a group of foreign correspondents in New Delhi. He said this will enable India to reach out to the redistribution centers in the nonaligned news pool independently over a stable channel. The foreign news agencies with which satellite and land links are to be established include TANJUG in Belgrade, IRAQI NEWS AGENCY in Baghdad, ANTARA in Jakarta and PRENSA LATINA in Havana. [Text] [BK270606 Delhi Domestic Service in English 0240 GMT 27 Sep 80]

CSO: 5500

REPORT ON PLA NAVY COMMUNICATIONS UNIT

OW280245 Beijing XINHUA Domestic Service in Chinese 0305 GMT 27 Sep 80

[Report by XINHUA correspondent Shen Yinggen and reporter Qiu Weimin]

[Summary] Beijing, 27 Sep (XINHUA)--The leading cadres of a long-wave communication station under a certain PLA navy unit have diligently studied modern communication technology and strived to become leading authority of the profession, thereby bringing about deep-going changes in the whole station."

Although some of the station's leading cadres joined the army during the war of liberation, they all possess the professional knowledge equivalent to a college graduate. These professional cadres have made continuous efforts in exploring the latest knowledge of their field.

"Thanks to the leading cadres' accomplishments in studying professional knowledge, the station has undergone the following four major changes:

"One, in performing their work in accordance with scientific law, the leading cadres have avoided giving arbitrary and impractical directions and bureaucratic practices. Last May when our country was preparing the experiment to launch the carrier rocket into the South Pacific Ocean, the station's leading cadres, in carrying out the task to establish communication with the ocean, went to the key working posts to work day and night with their staff members and exercise direct supervision and, using their professional knowledge and talents, overcame some complex technical obstacles in good time, thereby ensuring the successful completion of the task.

"Two, the station's modern equipment has been more effectively used along with the continuous elevation of the management level of the leading cadres. Based on the requirements of the station and the features of its equipment, the leading cadres have set up 16 sets of management system under which the station's tens of thousands of precision instruments, circuits and original parts are used in a rational and scientific

way. The system has also ensured safety for the personnel on duty to work around high voltage conditions. There has been no major accident involving injury or death.

"Three, the leading cadres have paid more attention to cherishing, training and selecting talented people. In the past few years, the leading cadres have edited 27 kinds of teaching materials and 16 outlines for professional training and trained 154 technical cadres to serve not only the need of their own unit but also for other fraternal units and local people.

"Four, they have harnessed the masses' enthusiasm by paying more attention to giving full expression to democracy in scientific and technical discussion and research."

In the past few years, the station has achieved 24 major technical innovations that have been commended by the leading navy organ.

CSO: 5500

## THAILAND

### BRIEFS

NEW RADIO STATION--A new Radio Thailand station in Maha Sarakham Province was officially opened on 20 September. It has transmission power of 10 kilowatt on the am band. [BK260559 Bangkok Domestic Service in Thai 0530 GMT 20 Sep 80]

CSO: 5500

POLAND

BRIEFS

HOLY MASS BROADCAST--The technical-organizational preparations for the transmission of the Holy Mass by radio have been completed. In compliance with the appropriate agreements the 1-hour Holy Mass will be broadcast every Sunday from the Church of the Holy Cross in Warsaw in the Krakowskie Przedmiescie Street over the second national program of Polish radio on long wave 1,500 meters, which is a frequency of 200 kilohertz; and also on medium and VHF. Polish Radio will broadcast over regional transmitters the frequencies on which one can hear the Holy Mass. The first transmission will take place tomorrow [21 September] at 0900. [Text] [LD200954 Warsaw Domestic Service in Polish 0930 GMT 20 Sep 80]

CSO: 5500

## INTER-AMERICAN AFFAIRS

### BRIEFS

TELECOMMUNICATIONS CONFERENCE--Santiago, Chile--Official representatives from nine countries of the Americas are attending here a conference called by the International Telecommunications Union (ITU). The ITU is sponsored by the United Nations and the conference that is being held in Santiago is attended by representatives from Argentina, Brazil, Colombia, Costa Rica, Cuba, Chile, Mexico, Peru and Surinam. [PY022020 Paris AFP in Spanish 2342 GMT 1 Sep 80]

CSO: 5500

BRAZIL

BRIEFS

TELEVISION NETWORK EXPANSION--During the annual meeting of the heads of the 24 television stations that make up the Bandeirantes Television Network, the chairman-director of the network, (Joao Georges Saadi), announced that the enterprise will invest approximately \$25 million during the next 2 years in order to expand the network in Sao Paulo State and the rest of Brazil. [PY101459 Sao Paulo Radio Bandeirantes Network in Portuguese 1000 GMT 10 Sep 80 PY]

CSO: 5500

## NATIONAL MICROWAVE, TELEVISION SYSTEM DESCRIBED

Havana GRANMA in Spanish 30 Aug 80 p 2

[Article by Jesus Mena]

[Text] At a time when two of our fellow countrymen are completing their training in Star City in the Soviet Union for the Soviet-Cuban space flight planned as part of the Interkosmos Program, it is timely to speak about the development in certain areas of the communications media of our country, such as radiobroadcasting and international telecommunications services built during this 3-year period.

Before this joint space flight occurs with the participation of a son of the first socialist country in America -- a fact that will speak eloquently about the solid bonds of friendship and cooperation existing between the nations of Cuba and the Soviet Union -- it is fitting to recall that from the time of the triumph of the Revolution, our country has made serious efforts to expand and modernize its communications media, whose achievements were strengthened during the 1976-1980 period and for which we received the unselfish aid of our Soviet brothers.

Within this context, television occupies a prominent role, given the important place it has in culture, information and entertainment for our people.

In this field, in contrast to what happened previous to 1 January 1959, when television was used in keeping with certain commercial interests, serving those areas with the greatest purchasing power, such as the cities of Havana, Matanzas, Santa Clara, Ciego de Avila, Camaguey, Holguin and Santiago de Cuba, the Revolution decided to establish two national programs or channels (the current Channel 6 and Tele-Rebelde) and expand the service to the greatest amount of territory possible, using the equipment that existed at the time.

It was thus possible to extend the service to other cities and regions in the country, such as Pinar del Rio, San Cristobal, the Isle of Youth, Guantanamo, Baracoa, Moa and Niquero, although some of these places had only one channel.

Already early in the 1970's, the situation had changed substantially in comparison with 1959 and without major investments. However, the resources available were aimed at meeting needs in areas still not covered or poorly served and at meeting the limited possibilities and obsolescence of the equipment making up the system as a whole.

In order to resolve existing difficulties resulting from the sending of the signal originating from studios in Havana to each of the transmitters set up in the country, from Pinar del Rio to Baracoa -- which at that time constituted the major problem and the reason why in over half of the territory enjoying the service, the quality of transmissions was poor or simply intolerable -- one of the directives of the First Congress of the party oriented work in four basic directions:

Planning, purchasing and installing a new main artery for the National Microwave Relay System, which would support national telecommunications services from Pinar del Rio to Santiago de Cuba, replacing the inadequate and obsolete means in use to date; extending television service to new areas and improving it in others, all on both channels; replacing equipment which, because of a lack of parts on the international market or as a result of deterioration, could not guarantee the quality of service; and the introduction of the technology needed to transmit in colors on Channel 6.

By mid 1977, the plan designed was basically completed, including the establishment of the National Microwave System costing nearly 7 million pesos and having a large capacity and high quality. Through microwaves, the system connects the main national centers from which, by means of secondary stations, information is distributed that corresponds to national telecommunications services (telephone, Telex, telegrams, radio, television and others), through local systems.

Basically, this main artery has sufficient capacity to meet the country's current needs and those of the immediate future, equivalent to 960 telephone channels, 2 video channels and 8 for programs accompanying video and those broadcast by national radio. The signals are two-way, from Pinar del Rio to Guantanamo.

The National Microwave System, with French technology, is made up of 27 stations or buildings with equipment, towers and antennas properly distributed over some 1,000 kilometers, stations set up as a chain connecting with adjacent stations. From the functional standpoint, quality is on a par with the best in the world and operations are guaranteed 99.99 percent of the time.

In practical terms, this means that both telephone calls and television signals or signals from any of the services transmitted from one corner of the country to another, will have optimum quality except for fractions of a second at the worst possible time.

For the television service in particular, this new system has meant incomparable changes, but even where the interior of the country had facilities providing service previously, the signal given out by transmitters (video and audio) was inadequate, if not useless.

At the present time, the new chain makes it possible to obtain the same high degree of fidelity and clarity from one corner of the country to the other on both national channels and at the same time, the same facilities for two more programs in the opposite direction.

In order to take television to the Isle of Youth, a stunt was devised permitting the same high degree of quality on both channels.

#### Expansion of Television Service

The plan set up and completed during this 5-year period meant helping nearly half of all users in the country, enabling them to enjoy clear images and avoid the frequent and bothersome interruptions previously experienced.

With the installation of the new National Microwave System, the plan was also successful from the standpoint of quality and the addition of new areas covered.

While in 1975, between 85 and 90 percent of the country's population lived in areas where television service was received and for which purpose the system had 29 transmitters, in order to arrive at some 95 percent, it was necessary to increase the number to 55. In other words, the number of transmitters was nearly doubled because at this point, the areas not yet served are those with a low population density or small, isolated zones. But even in such zones, it was possible to extend the service except in certain instances.

The total number of transmitters purchased during the 5-year period was 33, of which 5 were used to replace an equal number that had been used for over 15 years. They were of American technology and for years, no spare parts had been available. The parts and components of these five were reserved to replace another 8 of the same technology still in use.

Other transmitters were used to complete both channels on the Isle of Youth, Guantanamo and Baracoa; at the Havana Libre Hotel, to improve reception in important areas of Plaza de la Revolucion; in Sandino, Cajalbana, Salom, Guines (only Channel 6), Cienfuegos, Trinidad, Sancti Spiritus, Nuevitao, Las Tunas, Bartolome Maso, Pilon, Chivirico and Yaguajay, the latter in the completion phase. At all these sites, it was necessary to build the buildings and antenna towers required.

Areas which in 1975 had absolutely no television service or which were inadequately served included Guano, Sandino, La Fe, Las Martinas, La Bajada, Mantua, Santa Lucia, La Esperanza, La Palma, La Coloma and Bahia Honda, in

Pinar del Rio; Guines (only Channel 6); Sancti Spiritus; Cienfuegos, Nuevitas, Tunas, Jobabo, Calisto, Manati and Puerto Padre, Las Tunas, Niquero, Media Luna, Campechuela, Yara, Bartolome Maso, Pilon and part of Manzanillo, in Granma; and Chivirico, Ocuajal del Turquino and La Plata, in Santiago de Cuba. They now have both channels with optimum urban quality.

Another important task completed in this 5-year period, one which constitutes a success for our communications systems and workers in the sector, was that of providing all Channel 6 facilities with the proper equipment for transmission in colors. The channel now has such facilities from one end of the country to the other.

11,464

CSO: 3010

## BRIEFS

AMMAN RADIO OPERATION--Jordanian broadcasting station sources have said that preparations are underway to transform the current Amman station into a popular local radio that will deal with all levels of the Jordanian society's activities. It will use direct contact with the people and will openly discuss social and development issues. This step is being taken because radio is the primary disseminator of development information and is easily accessible to all strata of society. A special board is expected to be created to direct the station, with the participation of responsible authorities from the departments of development, planning, national guidance, labor and education. The greater Amman station will begin transmission within the next 4 weeks and will work to project Jordan's activities and development plans abroad. (The greater Amman station was previously observed testing on 594 khz between July and August 1979) [Text] [JN242150 Amman AL-RA'Y in Arabic 23 Sep 80 p 24]

CSO: 5500

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

BRIEFS

ANA'S' FIRST ARAB TRANSMISSION--Aden, 22 Sep (ANA)--Najib Muhammad Ibrahim, member of the Central Committee and ANA director general, has stated that ANA's external Arabic transmission was successfully beamed yesterday to wide areas of the world. This step, he said, was in implementation of the resolutions of the First Congress of the Yemeni Socialist Party. It constitutes an important gain for all mass information media in our country. Through this transmission, he added, we will be able to disseminate widely most of the activities that take place in our country as part of the national democratic revolution. In a press statement today, the ANA director general pointed out that this success constitutes an important factor helping to intensify the effects of our political and ideological activities and to expose the activities of the imperialist and reactionary information media which are hostile to our Yemeni people's ambitions. This success also proves the successes scored by the workers of our country on the road of building the new progressive society under the leadership of the Yemeni Socialist Party. It is worth noting that the ANA experimental transmission in English began 2 weeks ago. It is beamed to the Arab Gulf, the Middle East, Europe and wide areas in Africa and Asia. [Text] [LD221734 Aden ANA in Arabic 1420 GMT 22 Sep 80]

CSO: 5500

YEMEN ARAB REPUBLIC

BRIEFS

SECOND EARTH SATELLITE--Brother Col 'Ali 'Abdallah Salih, president of the republic and commander in chief of the armed forces, this afternoon laid the foundation stone for the second earth satellite station in the southern suburbs of the capital, San'a'. On arrival he was received by brother Ahmad al-Ansi, minister of communications and transport, officials of the cable and wireless company, engineers and experts. Amid applause from the gathering, the brother president laid the foundation stone for the project. The brother president also inaugurated the seventh international telephone center of the cable and wireless company and held a telephone conversation with our embassy in Paris. He later toured various sections of the center. He also visited the training school of the company, unveiled the commemorative plaque of the project and toured the various sections of the school. [Excerpt] [LD280642 San'a' Domestic Service in Arabic 1200 GMT 27 Sep 80 EA]

CSO: 5500

## NONALIGNED WAY OF BROADCASTING VIEWED

London WEST AFRICA in English 22 Sep 80 pp 1843, 1844

[Text]

**THE NON-ALIGNED MOVEMENT**, pioneered by the late President Tito of Yugoslavia, moved to West Africa early this month with its second general conference of the Broadcasting Organisations of Non-aligned Countries (BONAC) which was held at the OAU Conference Centre, in Freetown.

The general conference was preceded by the sixth meeting of the Committee for Co-operation of Broadcasting Organisations of the Non-aligned Countries, which reviewed achievements of the organisation since its first conference in Sarajevo, Yugoslavia, three years ago and drafted new plans for recommendation to the general conference.

Opening the two-day meeting of the Committee for Co-operation, Sierra Leone's Minister of Information and Broadcasting, Dr. Idris M. Fofana, recalled the first conference of the organisation at Sarajevo in 1977 when its founding fathers not only laid the foundations of co-operation on a long-term basis, but also identified priority issues, among which were the development of infrastructures on a national level, the training of personnel and in particular the introduction of television in countries where none existed. He catalogued the first Radio Festival in India, the forthcoming Folk Song Festival and seminar in India and the setting up of the programme bank in Malta as noteworthy achievements of the organisation, and suggested that these varied forms of co-operation illustrate the kinds of possibilities offered for the development of programme co-operation.

In his address to the opening session of the second general conference President Siaka Stevens said that BONAC was born out of the attitudes adopted, decisions taken and recommendations made by the fourth and fifth summits of the non-aligned countries in Algeria and Colombo respectively, to set up an organ within the Non-aligned Movement that would make information accessible to all nations, with the ultimate objective of the removal of all pervasive domination of the world information spectrum by the multi-national Western-based international news agencies.

Since then, he went on, valiant efforts had been made to reverse the process of the growing disparities between the developed industrialised countries and the Third World countries in the distribution of communication resources and the need for a free and balanced circulation of information.

President Stevens said that the new world economic order complemented the new information order or the North-South debate on communication and referred to the forthcoming 21st UNESCO General Conference in Belgrade later this month, at which consequences for a new information order will be in the centre of the debates.

He urged delegates to give priority during their deliberations to issues related to the content and flow of information, obstacles and disparities in communication potentials, as well as the need for concrete measures towards communication development, creation of infrastructure, training and research.

Sierra Leone's head of the media and director-general of the Broadcasting Service (SLBS), Mr. Joseph Findlay, in his speech said that non-aligned countries were not just passive fence-sitters seeking the best from Eastern and Western blocs or mere spectators in the arena of international politics, but initiators and actors in the cause of international understanding and world peace. He said that delegates' presence in Freetown was a re-affirmation that non-alignment is not just a slogan or a vague concept, but a dynamic instrument of international co-operation. Their goal was to consolidate the plans, objectives and strategies which have been identified and recommended by the committee for co-operation.

The conference, which was attended by 105 delegates from 38 countries and international organisations, adopted a number of "strategies" aimed at the development of and co-operation between national broadcasting organisations of non-aligned countries, international organisations and regional broadcasting unions.

Among these are:

- Securing a frequency spectrum allocation which will, regardless of the present-day economic abilities of individual countries to use the frequencies, allow each of the non-aligned and developing countries to cover their national territory and to establish a balanced broadcast information and programme exchange flow with other countries.
- Comprehensive study and research on the technical and economic aspects of the solutions most advantageous to them for traditional (earth) and sophisticated (satellite) dissemination of radio and television programmes with a view to reducing the risk of out-dated and economically unjustifiable broadcasting technologies, hardware and development designs being sold to them.
- Promotion of broad mutual co-operation among member broadcasting organisations in designing national broadcasting development, in choosing equipment; in extending technical and expert assistance in supervising the construction and commissioning of broadcasting facilities as well as in

staff training.

- Standardisation of equipment, agreement on technical and technological standards and transfer of know-how and technology. This type of co-operation should contribute to better adjustment of equipment, to international programme exchanges, and to more efficient personnel training.
- Co-operation in training technical and programme personnel to ease the shortage of trained personnel, with emphasis on on-the-spot training (a significantly less expensive training approach) to allow the personnel to improve their knowledge in the normal course of their work. Extensive co-operation will be developed with UNESCO, with which joint training projects will be defined especially with regard to content and method of training and securing the necessary experts and resources for organising training.
- The creation and development of national news and information institutions as well as other forms of collecting and disseminating news and information, allowing authentic reporting with respect for the right of every country to develop along the road most suitable to it. BONAC will ensure comprehensive support to the co-operation of the news agencies of the non-aligned countries "so as to overcome effectively and as quickly as possible the deleterious impact of the existing monopoly of the large world information organisations".
- The development of a system of special radio and TV pools for news coverage of important events in the Non-aligned Movement.
- Exchanging radio and TV programme production teams.
- Opening correspondents' posts and a gradually expanding network of correspondents in the non-aligned and developing countries.
- Setting up programme banks for non-commercial exchanges of radio and television programmes. Member organisations will regularly inform each other of programmes available for exchange through the joint catalogue and through bilateral and multi-lateral co-operation.

- Developing various forms of co-operation in production of radio and TV programmes, including co-productions and assistance in providing specialised staff or technical resources.

- Developing a system of annual festivals of radio and TV programmes.

- The developing of co-operation among regional broadcasting unions, and more intensive co-operation with UNESCO.

The conference elected Mr. Joseph Findlay, Director General of SLBS and as chairman of the Broadcasting Organisations of non-aligned nations, for the next years. He will be assisted by his personal assistant and deputy head of programmes, SLBS, Mr. Sama Lenghor, who was elected Secretary General. The secretariat, in keeping with the practice of the non-aligned movement will be based in Freetown for the next three years.

The third general conference of BONAC is expected to be held in Cuba in 1983.

C80: 5500

## INTER-AFRICAN AFFAIRS

### BRIEFS

'PANA' POOL TO BEGIN--Dares Salaam, 22 Sep (AFP)--The proposed Panafrikan News Agency (PANA) will start operations next January with an East African News Pool centered in Khartoum, the Tanzanian News Agency, SHIHATA, said Sunday. It quoted a technical official of the Sudanese News Agency (SUNA) as saying SUNA would initially supply the necessary telecommunications equipment and teletype operators to the pool's 11 member countries--Sudan, Kenya, Ethiopia, Somalia, Uganda, Djibouti, Seychelles, Madagascar, Mauritius, the Comoros and Tanzania. The official, Mohamed Othman, said PANA would begin operating continent-wide by the middle of next year. [Text] [AB220713 Paris AFP in English 0642 GMT 22 Sep 80]

CSO: 5500

MOZAMBIQUE

COOPERATION WITH PALESTINIAN PRESS AGENCY

Maputo NOTICIAS in Portuguese 6 Sep 80 p 1

[Text] Beirut, 5 September (AIM [MOZAMBIQUE INFORMATION AGENCY])--AIM (Mozambique Information Agency) and WAFA (Palestine News Agency) today signed a cooperation agreement in the capital of Lebanon.

The agreement calls for the regular exchange of information and photographs between the two agencies and their disclosure within the respective distribution channels.

The accord protocol was signed for the AIM directorate by Carlos Cardoso and for WAFA by Fanny Hussein, deputy director.

Carlos Cardoso has been in Lebanon for a week now where he is making a visit in response to an invitation from the PLO.

WAFA is the second Arab news agency to sign an agreement with AIM. In December of last year, a cooperation agreement was signed with INA, the information agency of Iraq.

5058

CSO: 4401

## BRIEFS

**RELAY, SATELLITE STATIONS**--Two more radio relay stations are to be constructed in Cross River State. The project would be completed and commissioned by December, this year. The Director of Information in the state, Miss Martina Ikpa, announced this while explaining her department's policy to the Chairman of Ogoja Local Government area, Mr. Anthony O. Ogbeche. Miss Ikpa disclosed that the relay stations would be sited at Ogoja and near Uyo. The director said that the projects were embarked upon to improve the reception of the Cross River State Radio in Calabar. Miss Ikpa who was accompanied on the tour by the Chief Public Relations Officer, Mr. Moses Ekpo, also announced that two satellite stations were envisaged in the state to improve the transmission of the television station in Calabar. Both of them regretted the situation where the radio and television had not been able to serve several communities and pleaded with the public to exercise patience while renovations were being carried out on the stations. The director maintained that the equipment for the satellite installations had been acquired by the Federal Government and assured that the installation work would soon begin. Earlier, the chairman had strongly criticised the poor reception of the radio and television, adding that communities in Ogoja didn't pick the two stations. He urged the state government to take up the renovation work seriously in view of the impact the radio and television had on members of the public. [Excerpt] [Kaduna NEW NIGERIAN in English 6 Sep 80 p 7]

**COAXIAL CABLE SYSTEM**--A new system of transmitting telecommunication signals is to be introduced in the country. Known as the coaxial cable, the system will serve as an alternative route in the event of a fault in the existing microwave system. These facts were made known in Kaduna by the project manager for the Department of Posts and Telecommunications in the area, Mr Olu Kayode Kuforiji, while addressing a team of journalists currently on a tour of P and T projects in the country. He said that the terminal building of the new system has already been completed. Earlier the territorial controller for the state, Mr Francis Anyadike, had attributed the difficulties being faced by the corporation to the rapid rate of urbanization as well as the political and economic developments of the past 10 years. [Text] [AB220924 Lagos International Service in English 0830 GMT 22 Sep 80]

**RADIO CORPORATION TESTS TRANSMITTER**--The new station of the Federal Radio Corporation of Nigeria, FRCN, in Abuja will start test transmissions today. Voice of Nigeria is an arm of the Federal Radio Corporation of Nigeria. Signals from the station can be picked up on 909 khz, 330 meters in the (?medium wave) band from 6 in the morning until 11 at night [0500-2200 GMT]. Formal broadcasting will commence from the station on national day. [Excerpt] [LD251746 Lagos International Service in English 0830 GMT 25 Sep 80]

## SOUTH AFRICA

### BRIEFS

TELECOMMUNICATIONS DEVELOPMENTS--Two of the most modern telephone switching systems in the world are to be introduced in South Africa next year. The minister of posts and telecommunications, Mr Henie Smit, has announced that the post office is acquiring two new exchange systems from West Germany and from France. These will be introduced in the Johannesburg and Pretoria areas. Mr Smit, who officially opens a new post-office at Stilfontein in the Western Transvaal this morning, said that in addition to the new switching systems a number of new services were in the offing. These included push-button telephones with built-in memories, videotext--a system which enabled telephones to be connected to a television set and allowed the user to draw on information from a central data bank, and video-conference, which enabled businessmen to confer with associates in other cities. Mr Smit said this development would put South Africa ahead of many industrialized countries. [Excerpt] [LD251750 Johannesburg Domestic Service in English 1115 GMT 24 Sep 80]

CSO: 5500

## MEDIUM WAVE TRANSMITTERS INSTALLED IN FIVE PROVINCES

Lusaka TIMES OF ZAMBIA in English 25 Sep 80 p 5

(Text)

**ZAMBIA Broadcasting Services has installed medium wave transmitters in five provinces as part of its expansion programme to improve services in the country, chief engineer, Mr Churchill Mutale said in Lusaka yesterday.**

Transmitters would be installed at Chipata, Mongu, Solwezi, Mansa and Kasama.

Mr Mutale said the installation of medium wave transmitters would improve radio reception and later television service in the areas.

Two transmitters had been installed in each of the provinces and were now on test.

Mr Mutale said ZBS had plans to extend coverage from the line of rail to provincial headquarters in all parts of the country adding that with funds available services could be extended to all districts.

## Reception

Mr Mutale said Chipata, Petauke, Mpika, Serenje, Kaoma, Mumbwa and Mongu would have television reception by the end of the year when the Posts and Telecommunications Corporation increased the micro-wave link.

Two years ago, the then director of ZBS Mr Edgar Chellah announced feasibility studies to provide and extend effectively radio reception throughout the country.

Studies on television expansion to areas away from the line of rail were made when President Kaunda commissioned the Nakonde-Kasama-Lusaka microwave link which is part of the Pan-African link.

Mr Chellah had said there was ignorance about the activities of the Party and its Government in areas where radio reception was poor although the majority of Zambians lived there.

ZBC EXTENDING ITS NETWORK TO REACH ALL THE PEOPLE

Salisbury THE HERALD-BUSINESS HERALD in English 25 Sep 80 p 8

[Text] The Zimbabwe Broadcasting Corporation would like to see the mass media contributing to "the creation of a new man for the new society."

In the words of the Corporation's director of programmes, Mr Charles Ndhlovu: "The new man would be above racism and tribalism. He would not suffer from the disease of nepotism...but would be able to accept criticism and put self-criticism into effect.

"This man would accept the reality that to everything there must be a negative and positive aspect."

Mr Ndhlovu said the people of Zimbabwe as a whole were the seed for this new man. "It should be allowed to sprout and emerge as a great forest of new men for the new society."

In a bid to accomplish this mammoth task the ZBC was committed to extending its communications network into the farthest corners of Zimbabwe.

The plan to update the Corporation--estimated now at a cost of more than \$19 million--is forging ahead. The sweeping exercise includes short and long-term training, the replacement of old equipment and the restructuring of programmes broadcast on radio and television.

As funds become available, these changes will become reality.

"We have already achieved quite a bit," said Mr Ndhlovu. "We have a board of directors working as a collegiate, which is proving highly successful. This example of working as a collective unit is being illustrated through the mouth-piece of radio...we are seen to be implementing the spirit of reconciliation."

Mr Ndhlovu said the Corporation was moving towards fulfilling the recommendations made earlier this year by the BBC. It had already successfully integrated the former Radio Harare and Radio Mtwakhasi as Radio Two.

"We felt there was a need to do this as both these services were used by the previous regime as a tool to divide the people," he said. "It promoted a spirit of tribalism and regionalism...the whole concept was racist."

#### Rural Areas

One of ZBC's prime concerns was to take the radio and television network deep into the rural areas, he said. This had to be done on a unified, national system.

"There has already been a substantial increase in the number of radio subscribers in Zimbabwe," said Mr Ndhlovu. "There has also been a slight increase in the number of television subscribers...definitely no decrease in either."

He said broadcasters on all services were being encouraged to spend more time with "the people"...to assess their wants and needs.

"The new summer schedules will include ideas which will emanate from the people themselves. Our programmes must be fed by our culture."

Plans to introduce a national education service for both radio and television were "well advanced," said Mr Ndhlovu. This was one of ZBC's priorities.

CSO: 5500

## DETAILS ON TELECOMMUNICATION SYSTEM GIVEN

Salisbury THE HERALD-BUSINESS HERALD in English 25 Sep 80 p 8

[Text]

ZIMBABWE has the third largest telecommunication system on the African continent.

In a paper prepared recently by the Postmaster General, Eng. G. C. Mills, the telecommunication infrastructure in this country was described as "soundly based and highly developed, despite under-capitalisation".

He said however, that the current lack of finance was a major problem for the Posts and Telecommunications Corporation. If it was not removed, it would be of serious consequence to the Corporation's ability to meet its future obligations.

"Under-capitalisation in the last five or six years has meant an insufficiency of plant and equipment and resulting need to introduce the provision of services on a priority basis.

"There is at the moment," he said, "a large suppressed demand for services. The lack of funds

to purchase plant and equipment has meant a denial of much-needed income, while the operation of obsolescent plant has meant increased operating costs."

Another problem being experienced by the PTC was the loss of trained staff.

Mr Mills said it took on average six to eight years to train staff to a high level of efficiency.

"The standard of service will inevitably deteriorate until we can remedy the position... we have no wish to employ expatriates."

## GROWTH

The Corporation's rate of growth recorded an upward trend immediately prior to and after independence in April this year, said Mr Mills. This was due solely to increased utilisation of the network primarily in respect of overseas traffic.

"This continued rate of growth in income, irrespective of traffic on offer, cannot however, be sustained as the capacity of the existing network is saturated," he said.

"Not until additional plant is installed will this situation be remedied. It takes a minimum of three years to obtain and com-

mission exchange plant on the scale required," he added.

Consequently, until funds become available, no improvement could be anticipated before three years had lapsed.

The present telecommunication system operating in Zimbabwe incorporates 97 telephone exchanges, of which 49 are automatic.

There are 214 000 telephone stations, some 28 percent of which are privately-owned. More than 90 percent of subscribers have access to STD — or Subscriber Trunk Dialling.

"Although at present these 92 percent have international trunk dialling only to Mozambique and South Africa, this facility will be available to them to Zambia within weeks," said Mr Mills, "and to the major countries of the world, provided we obtain funds, within 18 to 20 months."

He said the national telephone density in Zimbabwe was 2.96 per 100 population. By comparison, the figure for North America was 73.6; for Europe 20.5; in South America 4.9 and among member states of the OAU was 0.4 per 100 population.

## MICROWAVE

The country's two telex channels — one in Bulawayo and the other in Harare — serve more than 900 subscribers throughout Zimbabwe.

The comprehensive trunk network penetrating the country consists of OW lines, VHF, UHF and Microwave Radio Systems.

"The present position regarding international services," said Mr Mills, "is that we have adequate overseas links. Besides a direct HF service, we have 25 channels which transit South Africa using that country's Earth Satellite Station. By 1983 it is estimated we will require about 130 channels to 14 overseas destinations."

## EXPANSION

"We have adequate services to Beira in Mozambique with service to Maputo dependent on the Mozambican system."

There were also limited services to Zambia, he said, which within a very short period would be increased by 60 channels, achieved by restoration of previous trunk systems.

"Further expansion of services — including a TV capability — will have to await the installation of a Microwave link between Bulawayo and Victoria Falls. This has been surveyed and will be provided once funds are made available."

Mr Mills said there was a limited service in existence to Malawi using a

direct VHF link between Umtali and Blantyre. "This is the longest VHF link in the world," he said, "and is unusual due to its length and the ingenuity used in the adaptation of equipment to ensure its operation."

Services to South Africa operate via a Microwave link and include TV facilities.

Mr Mills said the existing system was fully capable of expansion to meet the demands of both a modern business society and to provide for the services needed in rural areas — at the same time, remaining financially viable.

## TECHNOLOGY

He said: "This healthy position has been brought about over a period of time by the correct choice of technology and an emphasis on the efficient management of this technology in the planning, developing and operating of the telecommunications network."

"This has provided for flexibility within the network to meet demands for its service both to date and for the future."

The Corporation's future plans will be based on two major criteria.

One is that telecommunications is an essential sector of the infrastructure and a fundamental factor in the economic and social development of the country. The other is the importance of ensuring the financial viability of the Corporation.

"The demand for telecommunications services is divided into two well-defined segments," said Mr Mills. "These are the commercial and the rural areas. Besides the division in terms of geography, there is a marked difference in terms of financial considerations."

## COMMERCIAL

"It is the commercial area from which the income has to be derived for the subsidisation of the rural area."

He said the Corporation's objectives in the commercial area was to provide every modern telecommunication facility for the public in order to maximise revenue earnings.

"This policy has the added advantage of ensuring that the commercial community will be on equal terms with their counterparts in the rest of the world — an essential requirement for the country's economic progress."

Objectives in the rural areas were to facilitate economic and social development by the extension of telephone services to every growth point where it was required or where it would serve a community.

"The service objective in the rural areas will be that 'every call is to be an effective call,'" said Mr Mills. "Consequently plant and equipment provision will be related to the ability of local staff to maintain it — and the equipment's proven capability to operate in the prevailing environmental conditions."

## BRIEFS

OLYMPIC RADIO, TV FACILITIES--And now a short review of the USSR state television and radio weekly GOVORIT I POKAZYVAYET MOSKVA. The new olympic radio and television center is beginning its post-olympic service. The large modern television and radio system, comprising the new olympic television and radio center, a switching center, a network of surface microwave and cable lines, and satellite communications systems, will allow a better use to be made of artificial earth satellites, primarily to provide television broadcasts for the regions of West and East Siberia, which was envisaged by the decisions of the 25th Congress of the party. From 20 October, the weekly reports, the first program of Central Television and All-Union Radio will be relayed to the regions of Siberia, Kazakhstan, Central Asia and the Far East at a more convenient time for their inhabitants. From 5 October the zone of assured reception for the fourth program of central television will expand. In future new steps will be undertaken to improve television and radio broadcasting in our country. [Text] [Moscow Domestic Service in Russian 0700 GMT 27 Sep 80]

CSO: 5500

# STEPS TAKEN TO PREVENT COMPUTER BANK THEFT, MISUSE

Paris LE MATIN in French 2 Sep 80 p 7

[Article by Guy Schwartz--passages between slantlines originally published in italics]

[Text] 15 billion francs. This is the estimate, by the International Association for Insurance Studies of Geneva, of the annual losses recorded in Europe in utilization of data processing. Losses which include, notably, those due to fraudulent utilization by programmers or to accidental or intentional destruction. This is why, in a reflection of what is happening in the United States, a French company of "advice on data processing security" has just been created. With high ambitions.

The misfortunes of some are definitely the fortune of others. The crimes perpetrated in recent months in France against computers of Philips and CII-Honeywell-Bull have in fact added weighty arguments to the commercial initiatives of a new category of service providers: advisers in data processing security. In particular those that work in the company which is perhaps the biggest of its kind in the Hexagon: Segesi.

Created in March by Pierre Leroy, a former director of Sema which is itself one of the biggest French data processing services companies, Segesi offers /"to identify and evaluate the data processing threats to enterprises or public organizations, to define and put into operation the data processing security system adapted to them."/ But it is not just a question of guaranteeing the continuity of data processing service in cases of interruption or destruction of a center, nor even of assuring the integrity of the data and the processing. It is also a question of protecting confidential, or even secret, information.

The crimes or accidents of which computers are the victims do not really represent the biggest loss sustained by their users. Fraud, in fact, seems a much more formidable factor. In 1979, for example, in the United

States, 475 cases of fraud were identified. A figure which makes it possible to estimate (there were) \$300 million in damages attributable to computer delinquency.

The creativity of computer swindlers knows no limit. The technique has long since been discovered whereby a knowledgeable programmer can systematically transfer to his account 1 or 2 centimes deducted from the paychecks of the thousands of other wage-earners at the enterprises where he works. We are also familiar with the swindle, unsuspected for 8 years, of a Californian who, 3 years ago, obtained for himself the 3 secret codes of the bank of Los Angeles where he was employed. Which enabled him to divert to himself the sum of \$10.2 million. But in all probability we don't know about the majority of the swindles, the best being, like crimes, those that are not discovered.

But one should not deduce from this that the preventive measures of a company like Segesi are only aimed against malevolence. Pierre Leroy points out in particular that it is also proper to be prepared against errors (involuntary) of manipulation or against the defective functioning of hardware and software. Which happens more often than one would think. For, contrary to the idea that the programmers are pleased to see propagated, a computer practically never makes a mistake. If the results it furnished are erroneous, it is because the data and the programs feeding into it are [erroneous]. Responsibility thus rests exclusively with the men in charge of the machine.

Today, some builders of computer hardware do not hesitate to estimate at 10 percent of sale price of the hardware the cost of security. That is to say that, to the degree that the measures of companies like Segesi prove effective, users have an interest in calling on their services. As has been the case, for several years, in the United States. Pierre Leroy in this respect is counting on profiting from the American experience. This is why he is in process of negotiating cooperation agreements with firms on the other side of the Atlantic.

The half-dozen specialists who for the moment constitute Segesi will certainly profit from it. A half-dozen who will beget offspring, since Pierre Leroy's goals are ambitious. /"There will be 20 of us by the end of next year, and 50 in 3 years,"/ he tells LE MATIN in fact. In order better to insure this progress, it is true, he can count on the technical support of one of his shareholders, Inforama, a company of data processing services and advice of 100 or so persons, but also, on the financial level, on another of his shareholders, Moyse Lownders Lambert, a Franco-British insurance group.

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CSO: 5500

## RESEARCH, DEVELOPMENT IN TELECOMMUNICATIONS

Oslo TELETRONIKK in English No 2, 1980 pp 198-212

[Text]

## Introduction

As a basis for my specific topic, I will start by giving some facts about Norway in general, and the Norwegian Telecommunications Administration in particular

## Norway

I feel that it may perhaps be best to present the basic figures for Norway together with those for your country:

|                                   | Osterreich | Norge   |
|-----------------------------------|------------|---------|
| Area km <sup>2</sup>              | 83 833     | 386 342 |
| Population million                | 7,5        | 4,1     |
| Main telephone subscriber         | 1 746 785  | 983 512 |
| New telephone connections 1977    | 166 315    | 44 594  |
| Telephone density                 | 32,5       | 38,6    |
| Telex subscribers                 | 16 343     | 6 200   |
| Datal modems                      | 3 876      | 4 287   |
| Land mobile telephone subscribers | 309        | 16 078  |

Roughly, compared with you we have four times the area and half the population.

Geographic similarities are high mountains, deep valleys, cascading rivers and quiet lakes. Differences are the shape of the country: a width vary-

ing between 430 km and 6 km and a length of 2 700 km of which almost half is north of the Arctic Circle, and the enclosure by the sea: deep fjords cutting as much as 200 km into the country, hundreds of thousands of islands and a main coastline of 21 000 km.

Thus, our sturdy country may offer even more hardship for the implementation and operation of telecommunications than yours.

## The Norwegian Telecommunications Administration

The Royal Ministry of Communications supervises five main administrative units concerned with roads, railways, post, telecommunications and civil air traffic, respectively. Thus, in Norway post and telecommunications have *separate* administrations.

The detailed directives for the Norwegian Telecommunications Administration state among others:

- The services are to be operated efficiently and in accordance with business principles, as far as this is consistent with social considerations, and specifically with reference to the subject of this lecture:
- The Administration shall take part in research & development in the telecommunications field in order to exploit the possibilities for improvement and rationalization of the operations and explore the requirements for further expansion of the services in all parts of the country, and work out plans for meeting these requirements

The organigram of the Norwegian Telecommunications Administration is seen in Fig. 1a - 1c:

- Fig. 1a shows the main organizational lines.

The *Board* consists of six members. Five of these are appointed by the government for a four-year period, the sixth is the Director-General who serves for six-years periods. One of the five appointed members shall be an employee of the Administration.

The *Council* consists of 15 members. They are appointed for a four-year period; one third by the parliament, the government and the employees, respectively.

The *Central Administration* has the main staff function, for further details see Fig. 1 b. It is

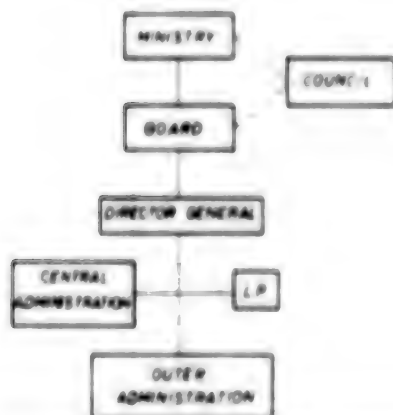


Fig. 1a Main organigram for the Norwegian Telecommunications Administration

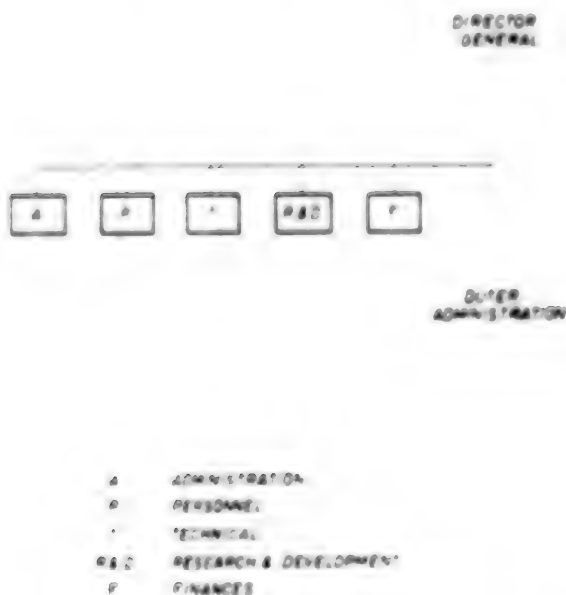


Fig. 1b The Central Administration

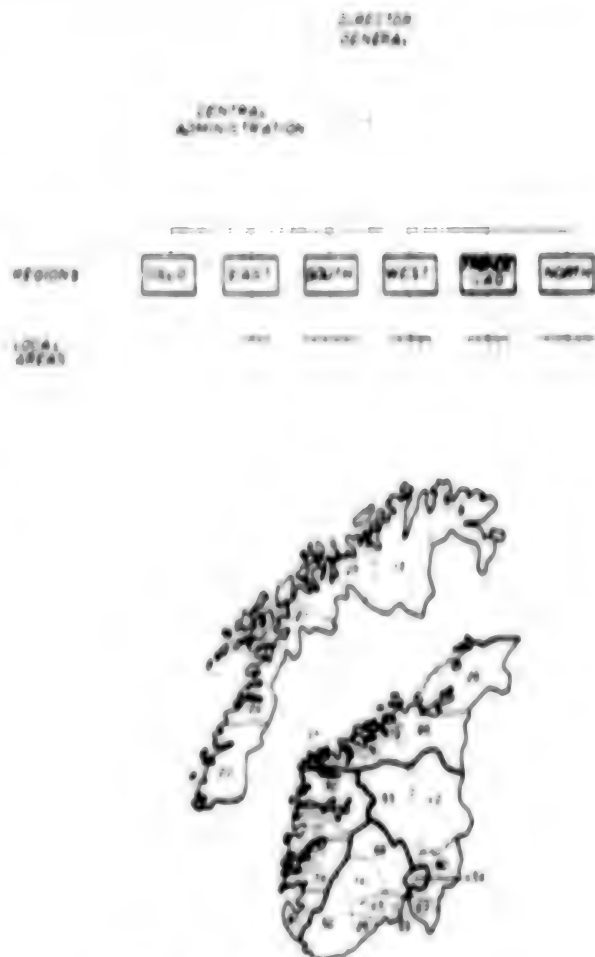


Fig. 1c The Outer Administration

located in Oslo (except for the Research & Development Department), and the personnel strength is 1 457.

The *Outer Administration* counts 18 432 people, for further details see Fig. 1c.

With the present general policy of decentralization and strengthening of local activities in Norway, it is expected that future growth mainly will be in the Outer Administration, and not in the Central Administration.

*Long-range planning (LP)* is organized in the following way:

- The LP committee, which consists of the Director-General as chairman, the five department directors from the Central Administration and the six regional directors from the Outer Administration, has the *steering* responsibility.
- A small secretariat staffed by economists and engineers has the *coordinating* responsibility.

- The various units in the Central Administration and the Outer Administration have the *professional responsibility*.

In this way it is avoided that the long-range planning is in the hands of an exclusive group who later never would be faced with the consequences of their ideas. Instead, the work is steered by the top leaders, and the planning is done by those units which later will be responsible for the implementation and operation. The long-range plan will comprise three four-year programs with a decreasing degree of detailing, and also contain certain perspectives up to year 2000.

- Fig. 1b shows the Central Administration.

There are five departments, each headed by a director:

- Administrative
- Personnel
- Technical
- Research & Development
- Finance

The main tasks of the Central Administration are nation-wide coordination and preparation of general guidelines and instructions.

- Fig. 1c shows the Outer Administration.

In addition to Oslo, there are 27 local areas divided among 5 supervising regions. To give an idea of their size the number of telephones · 10<sup>3</sup> in each local area is indicated.

The main tasks of the Outer Administration are daily operations, detailed planning and customers services.

The Norwegian Telecommunications Administration is responsible for the implementation and operation of:

- The public telecommunications networks for telephony, telegraphy, telex, datel, etc.
- The public land mobile telephone service.
- The maritime services for ships both on the oceans and on the coastal waters.
- The telecommunications with the oil rigs in the North Sea.
- The program channels and transmitters for sound and television broadcasting.
- The aeronautical radio services.

I will quote some figures to broadly illustrate these activities:

- Of the trunk lines 65% are carried by radio links and 29% by coaxial cables.

- There are 134 VHF and 18 UHF base stations in operation for the land mobile telephone service.
- Norway ranks as number five in the world in mercant shipping with about 2 000 ocean-going vessels. Furthermore, about 4 000 fishing and coastal ships require mobile telecommunications services. In order to meet these requirements, the Administration operates 1 large HF radio station (Rogaland), which handles on an average 500 telephone calls per day with ocean vessels all over the world, and 24 MF + 57 VHF radio stations for coastal traffic with an average of 3 000 calls per day. In addition, there is a continuous watch on the emergency and calling frequencies.
- In addition to the 21 (LF, MF and HF) broadcasting transmitting stations, there are 468 VHF transmitters for sound and 989 for television broadcasting. These 989 transmitters provide a coverage of 95,8% of the population, but about 1 400 further transmitters are required to give full coverage.
- There are 44 civil airports in Norway equipped with landing and communications facilities and 170 en route installations along the airways.

#### International and Nordic cooperation

Norway participates in the work of the International Telecommunications Union (ITU), the Conférence Européenne des Administrations des Postes et Télécommunications (CEPT), the International Telecommunications Satellite Organization (INTELSAT), the International Maritime Satellite Organization (INMARSAT), the Interim European Telecommunications Satellite Organization (INTERIM EUTELSAT), the Inter-Governmental Maritime Consultative Organization (IMCO), the International Civil Aviation Organization (ICAO), etc.

Furthermore, a close cooperation in the telecommunications field is established between the Nordic countries: Denmark, Finland, Iceland, Norway and Sweden. Based on the Nordic telecommunications agreement, unified positions on operational and technical matters are worked out and common projects fostered. Thus, there is a Nordic earth station operating in the INTELSAT system, a jointly specified and procured Nordic public data network will become operational during the coming year, and joint specifications for an automatic land mobile telephone system have just been finalized.

## History

From long time ago there have been laboratory activities in the Norwegian Telecommunications Administration, mainly concerned with equipment which was in use. Thus, from 1961 there existed a *Central Laboratory* with 24 people.

From about 1950 there were discussions both inside and outside the Administration concerning a more active attitude towards research & development. This was undoubtedly inspired by the new developments in microwave techniques, semiconductor technologies and broader system considerations together with a general wish to strengthen Norwegian telecommunications industry. A program for a Research Establishment was worked out and approved in 1968 as a guideline for the building-up phase, and during the following years its staff increased by 10-15 per year.

In connection with a major reorganization of the Central Administration in 1972, the Research & Development Department was created, comprising the Central Laboratory and the Research Establishment. New plans were then made for an expanded Central Laboratory, and the Research Establishment has grown further.

Thus, our Research & Development Department is indeed a *youngster*, who thanks to good support from the mother organization has grown and matured happily. The past years have offered many challenges, and more will certainly follow.

## Main tasks

### The Research Establishment

The tasks of the Research Establishment deal with two main aspects:

- Problems arising from the existing telecommunications networks and which require new solutions in order to the full benefit from the huge investments which these networks represent.
- Introduction of new technology and new methods in order to improve or expand the services.

In order to explain the main role of the Research Establishment in relation to those of other parts of the Administration, I will refer to Fig. 2, which shows the four main phases of a project from it is conceived until it is operational:

- Generation of ideas.

The Research Establishment is responsible for

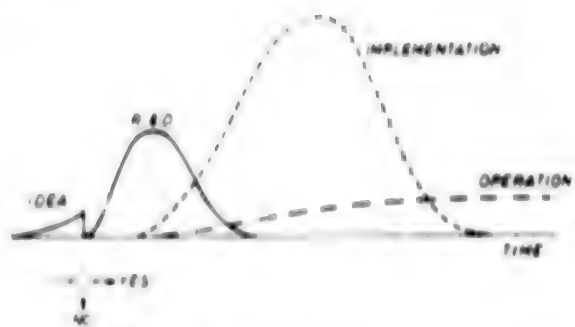


Fig. 2 Four main project phases

- keeping itself currently well informed about the development trends concerning existing and new telecommunications *services, techniques* (networks, systems, equipment, components and technology) and *methods*,
- evaluating these trends in relation to the requirements and the possible applications in the telecommunications networks,
- informing relevant bodies in the Administration and industry about development trends of importance to them,
- presenting proposals and specifications for new research & developments projects either based on own evaluations or on requests from others.

Up to this point in the project history the effort in money and manpower will usually be relatively modest, and we do not have to be too restrictive in our actions. However, the decision *yes/no* whether to carry on or not, is important, because the following phases will normally imply high expenses and also in many cases have significant consequences for the personnel.

- Research & development.

This phase can typically be divided in the following activities:

- Building up of special competence and evaluation of specific principles and technology, often based on theoretical and/or experimental investigations.

This part will naturally be the task of the Research Establishment, if necessary assisted by outside consultants.

- Statement of broad technical and operational requirements, including interfaces.

This part involves departments in the Central Administration and also the Outer Administration, which ultimately will be responsible for the operation.

- Development of more detailed specifications. This part involves the Research Establishment, other departments in the Central Administration, the Outer Administration and often also the industry.

In many cases it may be advantageous to carry out investigations in a limited geographical area under clearly specified conditions, before tackling a countrywide solution.

- Implementation.

The main responsibility of the Administration normally lies with the Technical Department, supported by the Outer Administration. Orders for production are placed with the industry.

- Operation.

The main responsibility is here with the Outer Administration.

The time scale in Fig. 2 may be quite different for different projects, but I hope that it illustrates the point I wish to make concerning the roles of the various bodies involved:

Research Establishment - catalyst and architect  
Technical and other

Departments - building master

Outer Administration - user (resident)

Industry - co-developer and supplier.

Obviously, our role is a delicate one, which has to be played with diligence and care in order to keep the right balance between an enthusiastic perseverance for meeting the challenges of *future* goals and a more down-to-earth attitude for solving *today's* problems. Being too enthusiastic, we may be ruined - but if we are too reluctant, *our children* will be ruined! We try to deal with this dilemma by usually insisting on having people from other departments or the Outer Administration taking part in our projects, either as active project participants or as members in the project steering committees.

### The Central Laboratory

The Central Laboratory shall perform measurements and investigations with the aim of ensuring that quality requirements are met in the various

components and systems which form parts of the overall telecommunications facilities.

This responsibility implies:

- Type control and sampling tests of all subscriber equipment which are intended for connection to the public telecommunications networks, and all equipment for private radio systems.
- General instrument services for the Norwegian Telecommunications Administration.
- Development and design of special equipment.
- Advisory function for quality evaluation of components and equipment, and reliability considerations in general.
- Acoustic investigations of both equipment and buildings.

## Organization and personnel

### The Research Establishment

It is our belief that research & development activities should be organized to be as *flexible* as possible.

In the Research Establishment we have adopted a *matrix* working system, see Fig. 3, which implies that:

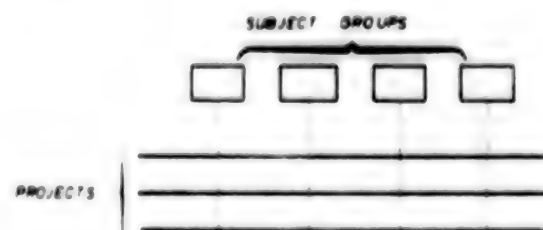


Fig. 3 Matrix working system

- the staff is divided into *subject groups*, each headed by a group leader,
- *project teams*, each headed by a project leader, is formed for the various specific tasks.

Each subject group is responsible for the professional competence in its field and prepares budgets for the equipment and the time needed for its members. The subject groups are established, modified and dissolved according to the needs at any time. The function as group leader does not have any salary implications; a group leader may well be at a lower salary level than members of the

Fig. 4 shows our present subject groups. They belong to two divisions, each headed by a Chief of Research.

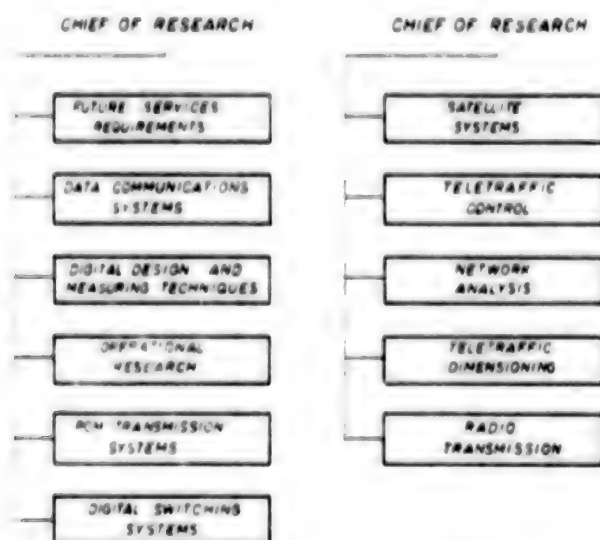


Fig. 4 Subject groups in the Research Establishment 1978

In total, there are 67 persons with university degrees (Dipl.-Ing. or higher and similar levels in other subjects such as mathematics, physics, economy and even sociology) and 11 engineers/technicians.

### The Central Laboratory

In the Central Laboratory we have, partly for historic reasons and partly because the work is less project-oriented, a more rigid organization. The staff is also here organized in subject groups. Much of the work is performed inside these, but project teams are formed in specific cases.

Fig. 5 shows the subject groups in the Central Laboratory, which is headed by a Chief Engineer.

In total there are 24 persons with university degrees and 35 engineers/technicians.

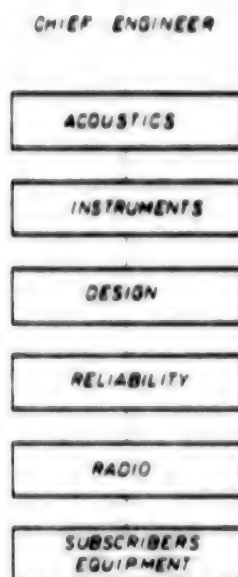


Fig. 5 Subject groups in the Central Laboratory

### The Administrative Unit

In order to relieve the professional staff as much as possible from administrative and routine work, we have formed an Administrative Unit which takes care of all supporting services, including the mechanical workshop.

The number of persons is 27.

## Total

The organigram for the Research & Development Department is thus as shown in Fig. 6.

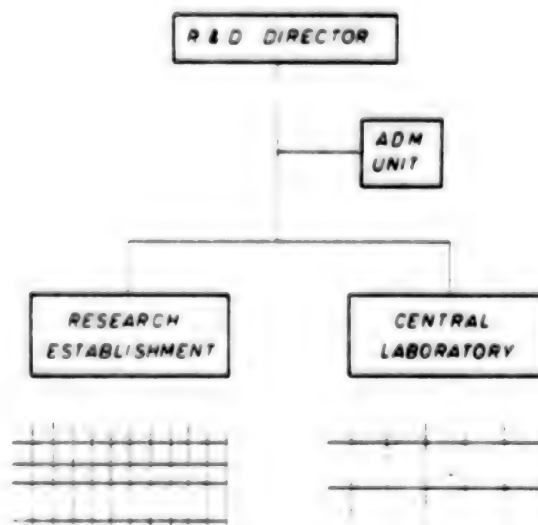


Fig. 6 The Research & Development Department

The total staff amounts to 164 persons.

The heads in the blocks form a collegium, where matters of general interest for the operation of the Research & Development Department are discussed.

#### Certain personnel aspects

The Research & Development Department is a young institution itself, and the staff is also young. In the Research Establishment the average age is 31 years with very small variations through the years. In the Central Laboratories it is 34 years.

Our experience is that it has been rather rare to get suitable candidates from the industry for our scientist positions. We mostly get applicants fresh from universities or with a few years of experience from university circles. In our rapidly developing field of work, people who just have finished their education and have an open mind, may relatively soon be able to give valuable contributions in specific areas under the guidance of key people with a broad system view. However, there is a tendency that the key people like to pursue a particular project beyond the idea phase, and thus leave the Research & Development Department in order to join the body responsible for implementation or production. Although it temporarily hurts us, this career pattern has been of great benefit to the Administration as a whole. The Research & Development Department is undoubtedly a valuable source for recruiting promising candidates who eventually find their place in other parts of the Central Administration, in the Outer Administration or with our suppliers.

The staff uses on an average about 15% of their time for increasing their general professional competence by participation in internal colloquia and external courses, general library studies, etc. Furthermore, there is an established practice that those who are granted a scholarship from the Norwegian Council for Scientific and Industrial Research for a one-year study abroad will get leave of absence with full salary if married and half salary if single. We have about one staff member per year benefiting from this arrangement.

#### Housing

The Central Administration is located in downtown Oslo, which clearly is not a suitable place for laboratory activities. It was therefore decided that

a new building for the Research & Development Department should be constructed at Kjeller, about 20 km from the rest of the Central Administration. Kjeller was selected because there are other research activities located there: the Norwegian Defence Research Establishment, the Institute for Atomic Energy, the Air Material Command, etc.

Our building is pleasantly located in a rural area, see Fig. 7. The first block was completed in 1973, and the second block and an Acoustics wing in 1977.



Fig. 7 The building of the Research & Development Department.

The total floor space is 6000 m<sup>2</sup>.

We have made a point of having a maximum of flexibility. Except for the special laboratory rooms, all walls are removable, and there are cable ducts with outlet cabinets between each window.

The special laboratory rooms are:

- Anechoic acoustics chamber with a lower limiting frequency of 90 Hz for electroacoustical measurements.
- Reverberation chamber with a volume of 200 m<sup>3</sup> for evaluation of telephone kiosks, etc.
- Several listening rooms for subjective tests of speech quality and for experiments with conference telephony.
- Climatic room of 15 m<sup>3</sup> for temperature and humidity testing.
- Vibration test laboratory with a dynamic force of 6200 N.
- Anechoic microwave chamber with a lower limiting frequency of 1 GHz.

The roofs have platforms for antenna measurements.

Furthermore, we have a small transmit/receive earth station for propagation measurements of 11 and 14 GHz signals from satellites.

## Finances

Our accounts for the year 1977 are as follows:

|                                                                | Mill<br>N Kr  | % of<br>total |
|----------------------------------------------------------------|---------------|---------------|
| Salaries, incl. social<br>expenses                             | 15,800        | 44            |
| Buildings, furniture,<br>electricity, office<br>expenses, etc. | 1,400         | 4             |
| Travelling, transport, etc.                                    | 0,350         | 1             |
| Technical equipment                                            | 4,800         | 14            |
| External contracts                                             |               |               |
| with                                                           |               |               |
| industry                                                       | 8,050         | 35            |
| institutes                                                     | 4,300         |               |
| Investment tax                                                 | 0,800         | 2             |
| <b>Total</b>                                                   | <b>35,500</b> | <b>100</b>    |

(Approximately Mill O Sch 111)

I wish to stress the item *external contracts* amounting to 35% of our total expenditures. 65% of this amount goes to contracts with industry and 35% with institutes.

The total expenditures for the Norwegian Telecommunications Administration in 1977 was 1913 mill N kr for investments and 2763 mill N kr for operation. Thus, the research & development expenses were about 1,3% of the total operation costs.

## Working Methods

### Project steering

We have worked out a rather comprehensive system for project steering.

For each project a steering committee is appointed; it meets regularly to review the progress and if necessary modifies the course of action. The project team under its project leader carries out work and reports the results. The project program contains precise statements of the purpose and the aim of the project together with a detailed budget of expenses for equipment, computer services, our own personnel and possible external consultants.

A project termination report compares the actual expenditures with the budget and discusses possible discrepancies. The time used by each staff member on each project is recorded in order to give a complete picture of the costs involved.

### Contract arrangements

Since a large part of our activities is being carried out with the assistance of outside consultants/institutes and/or the industry, we have established a standard procedure for such research & development contracts, which enables us to follow the work closely, evaluate the progress and the results and, if necessary, introduce corrective measures at any stage.

The contract contains the following chapters:

- Description of work.
- Time schedule for the complete project and its sub-tasks.
- Manning.

We insist that the contractor specifies by name each person working under the contract and the percentage of his total regular working time which is allocated to the project. In this way we are sure to avoid that contractors in their bids display "big names", and then let others do the work.

- Price and payment.

Normally we fix an upper total limit and specify a rate per working hour for each person. Payment of costs incurred is made monthly.

- Reporting.

Progress meetings are held regularly, normally at least monthly. For these meetings the contractor shall present written reports.

The working papers shall be in such a form that they can serve as a basis for the final report.

The final report shall be approved or disapproved by us within 30 days of receipt.

- Modification and cancellation.

Both parties can propose modifications if the results, the technical development or other factors change the basis for the project.

- Patents.

This clause is based on Norwegian patent law.

- Property rights.

We insist that all results, methods, etc which are worked out under the contract freely can be used by the Norwegian Telecommunications Administration in further studies and for production, also with other contractors and companies.

However, except for these purposes, the results of the project will only be made known to a third party with the agreement of the contractor.

Normally, the contractor may freely use the results from the projects for his own product development and production in Norway and as a basis for his further studies in Norway.

Information which the contractor already possesses and which is not worked out, but used in connection with the contract, must on request be made confidentially available to the Norwegian Telecommunications Administration to the extent it is necessary for us in our evaluation of the results.

Publication in technical journals, etc. is agreed upon with due regard to the contributions made by each of the parties.

**Contacts.**

One person from each party is appointed as contact, and all correspondence is routed through them.

**Disputes.**

The contract contains a legal clause concerning disputes. Fortunately, we have little experience with this.

## External Cooperation

### The partners

So far I have, with reference to the directives for the Norwegian Telecommunications Administration, discussed research & development for the purpose of exploiting the possibilities for improvement and rationalization of our own operations, exploring the requirements for further expansion of our services and working out plans for meeting these requirements.

As the largest user of professional electronics equipment and the main authority in the telecommunications field, certain other obligations rest with the Administration, notably support and inspiration to industry and education in the telecommunications field. Reciprocally, industry and educational institutions are giving great support to the Administration.

In a small country like Norway it is important to avoid duplication of efforts. For example, when the Research & Development Department was established, it already existed modern laboratories for work in the semiconductor field at other institutes, and we therefore decided to make use of

these. Furthermore, the universities are well suited for studies of basic principles. Similarly, we feel that the industry should be brought in at a very early stage in the development of equipment, because the choice of components and production considerations are decisive for the detailed design. On the other hand, we must take care not to lose our own grasp on the subjects. We do therefore have some laboratories, and we make sure that we always are participating actively in the work of our contractors as members of the teams.

I like to stress that our working contacts with the universities is a good means for recruiting staff.

Thus, we enjoy and foster a *triangular cooperation* between the Norwegian Telecommunications Administration, the industry and universities.

In the following I will give a closer description of our relations with these partners.

### Norwegian electronics industry

For all kinds of electronics (telecommunications, entertainment, computers, automation, etc.) there are about 70 manufacturing companies with a total of 13000 employees in Norway. The distribution among the companies is rather uneven, three of them account for 60% of the total turnover. The output is only 1,7% of the total gross national product and 2,3% of the industrial national product. In this situation there are clearly limitations in the types of equipment which the Norwegian industry is able to cope with, for example there is no economic basis for the development of large switching systems.

In Norway, as in other countries, we have had and continue to have extensive discussions concerning purchases by state agencies, and in particular by the Norwegian Telecommunications Administration, in relation to national industrial policies.

There are several factors to be considered:

- The specific directives for the Norwegian Telecommunications Administration clearly state that its main task is to achieve telecommunications of a desired quality at the lowest possible cost.
- Purchase of nationally produced equipment and the presence of a competent and strong industry have certain advantages for the Administration, such as easier possibilities for assistance, modifications and extensions of the equipment and training of personnel.
- The general purchase rules for the state agencies

clearly state that the lowest bid which meets the specifications shall be accepted, only in exceptional cases of great importance to industry or local districts the Royal Ministry of Industry may decide otherwise. The business is closely controlled by the independent State Audit Authority which reports directly to the parliament. Various international agreements (EFTA, EEC, GATT) impose certain restrictions concerning national industrial policies.

There are voices both from the industry and local authorities for using purchases by the state agencies as a means for promoting national research & development and production and for strengthening the economy and employment in local districts.

In 1977 the percentages of nationally produced equipment of various kinds for the Norwegian Telecommunications Administration were

|                                     |     |
|-------------------------------------|-----|
| Transmission                        | 78% |
| Switching                           | 92% |
| Subscriber equipment                | 64% |
| Vehicles and construction equipment | 70% |
| Broadcasting and aeronautical       | 81% |
| Miscellaneous                       | 66% |
| Total                               | 79% |

The purchase rules for the state agencies have recently been reviewed by the government and discussed by the parliament. Generally, they are not basically altered, although a possibility for purchases by negotiations has been introduced.

The new general rules for research & development contracts to be awarded by state agencies state that they should preferably be let to Norwegian companies. In special cases they may involve later production. Contractors who have had research & development contracts can take part in the competition for subsequent production contracts.

As stated previously, the Norwegian Telecommunications Administration feels an obligation to keep the industry currently informed about new development trends, and we place research & development contracts for specific projects at an early stage. In this way the companies concerned are reimbursed of some of their expenses for building up competence on particular subjects, but they have no guarantee of subsequent purchases, and it

is up to the companies themselves to decide if and how production and marketing shall be performed.

### The Technical University of Norway and SINTEF

In Norway there is one Technical University (NTH), which is located in Trondheim. The number of students is 4600, of which 450 are in the electronics sections of the Electrical Engineering Department.

The Technical University is organized in the traditional *Technische Hochschule* style, and gets its funds from the Royal Ministry of Church and Education. However, it has one important asset: The Foundation of Scientific and Industrial Research (SINTEF). Since this institution is quite unique in Europe, I will describe it in some detail.

SINTEF was established in 1950 as a free foundation with the two main tasks

- to foster and stimulate applied technological research at the Technical University,
- to organize and perform research & development under contracts with customers in industry and the public sector.

An interesting feature is that SINTEF is located on the campus and shares office and laboratory facilities with the Technical University. Experience has shown that the cooperation has been of great mutual benefit:

- SINTEF's research capability is enhanced by the participation of faculty members acting as consultants. In general project plans and reports are to be approved by the professor responsible for the particular subject area.
- The Technical University's teaching capability is strengthened by SINTEF employees being engaged as part-time professors and lecturers, in particular for the graduate program, and as supervisors for main thesis works (Dipl.-Ing. Arbeit).
- Scientific equipment from both institutions is available to both and complement each other. All purchases are normally coordinated and in many cases shared.

Thus, SINTEF brings together the academic and the industrial aspects, and is well suited for dealing with multi-disciplinary subjects. The whole co-

operation is based more on personal trust and common sense than on detailed written rules.

SINTEF's total turnover for 1977 amounted to 126 mill N kr (approximately 463 mill O Sch). The main activities and their relative contributions can be grouped as follows:

|                                             |     |
|---------------------------------------------|-----|
| - Civil engineering and hydrodynamics       | 25% |
| - Automation and data processing            | 21% |
| - Electronics and acoustics                 | 18% |
| - Chemistry and metallurgy                  | 15% |
| - Machine design and production engineering | 17% |
| - Social and hospital research              | 4%  |

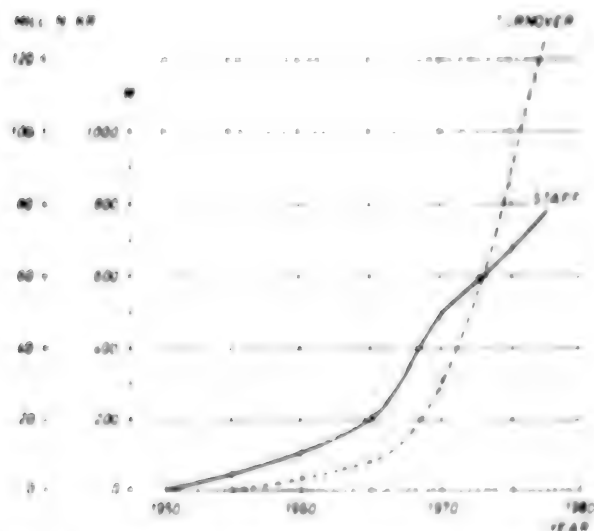


Fig. 8 Growth of the Foundation of Scientific and Industrial Research SINTEF at the Technical University of Norway.

SINTEF's growth is illustrated in Fig. 8.

The distribution of income from the clients in 1977 was:

|                    |     |
|--------------------|-----|
| - Private industry | 51% |
| - Public sector    | 38% |
| - Foreign          | 4%  |
| - Others           | 7%  |

SINTEF is organized in various divisions and six laboratories. Here I only mention the Electronics Research Laboratory (ELAB), which is responsible for the activities in telecommunications, physical electronics and acoustics. ELAB's turnover for 1977 was 21 mill N kr (approximately 77 mill O

Sch); the largest single client being the Norwegian Telecommunications Administration accounting for 18% of the income. The total number of staff was 121, of which 67 have university degrees, and this matches very closely the faculty staff concerned with the same subjects. ELAB has grown in very much the same rapid way as its mother organization, but the expansion is now coming to a halt because the number of faculty staff seems to be stabilized.

## Brief survey of activities

An indication of the particular areas in which the Research & Development Department is active, can be read from the names of the subject groups in the organigrams which I presented for the Research Establishment and the Central Laboratory, respectively.

In addition, there are developments of equipment and methods for more immediate use in the other departments concerned. Examples are small television transmitters, pulse code modulation systems and various administrative computer systems for the daily operations.

I shall not give a detailed account of our work, but only briefly survey some main areas and mention some specific projects.

Many of the types of tasks we are dealing with, are — I am sure — also of great concern to many of you.

The rapid and accelerating development of the electronics technology is certainly well known to this assembly. Nevertheless, I would like to mention two illustrations:

- A typical large-scale-integration memory circuit from about 1970 contained about 2500 components on an area of 10 mm<sup>2</sup>, which at that time was considered to be extremely impressive. However, this achievement is rather moderate in comparison with the Nature's creation, because in order to obtain the same memory capacity as that of the human brain, 4.10<sup>9</sup> such circuits, or an area of 40 decarees of them, would be required. Today, this capacity can be stored in a magnetic bubble mosaic of 100 m.
- The semiconductor development started with the transistor in 1947. If the Volkswagen, which appeared at about the same time, had developed at a similar pace, it would today

- cost 50 O Sch each
- consume 1 milliliter per 10 km
- have a maximum top speed of 100000 km/hour
- have a lifetime of 10000 years.

Science fiction appears to be an almost too conservative description of this development!

The digital electronics technology has given rise to the relatively new field of computers. The much older field of telecommunications has long kept to more traditional technology, and digitalization has so far mainly been limited to pulse code modulation transmission. However, now there are clear signs of drastic changes, and we are entering a *new and forceful generation of telecommunications* with digital signal processing, switching and transmission — in marriage with computers — for cost-effective and advanced services.

With the existing equipment and planned extensions the Norwegian telephone network will in 1981 have 1.5 million main subscribers, 11000 local private branch exchanges, 2000 local exchanges, 220 local transit exchanges and 11 major regional exchanges. We are studying the strategy for *evolving this analog telephone network towards a digital, integrated-services network* with 64 kbit/s user circuit capacity.

Our approach has involved several steps:

- 1) When the Research Establishment was founded ten years ago, we selected *data transmission* as a major field of activity. We worked out system specifications for a data network for field trials, which was implemented in close cooperation with three industrial companies, each developing separate parts of the equipment. Thus, a first all-digital switch was designed in 1973, and experience gained from operation with live traffic. Special attention was given to network control aspects.
- 2) Armed with the experience from step 1) we entered into a close cooperation with the other Nordic telecommunications administrations on jointly specifying and implementing the *Nordic Public Data Network* which will become operational in 1979. It will offer full duplex digital circuit-switched data services with transmission rates up to 9600 bit/s, see Fig. 9
- 3) We are now in step 3). We are considering a strategy which implies, see Fig. 10

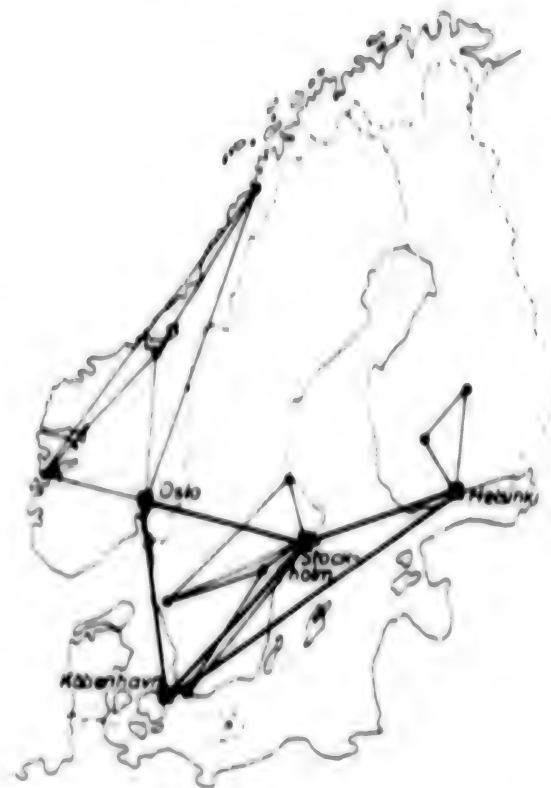


Fig. 9 The Nordic Public Data Network

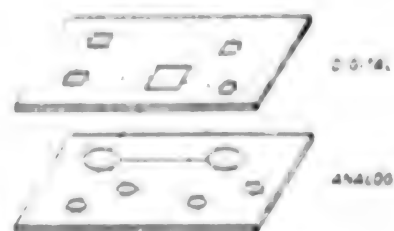


Fig. 10 Digital evolution

- digital replacement and expansion of local point and local area equipment,
- creation of an *overlay digital network* between main business centers.

This digital network will in the first phase offer its services to business subscribers with advanced requirements ("first class"), and then gradually be expanded to serve the private subscribers who in the meantime have remained in the analog network ("tourist class"). Fig. 11 illustrates the envisaged network structure.

In addition to the architectural study we are investigating relevant devices for transmission,



lenges for the telecommunications administrations, but also for competitors with increasing abilities to meet alternatives to our traditional services. If a vacuum occurs, there will be forces to fill it, in spite of present monopoly situations. We have analogies from Hollywood which almost went bankrupt because they based themselves on the particular *technique* of the film, rather than to realize that their business was the *service* of entertainment, or the coal dealer who concentrated on the particular *medium* coal and too late discovered that his business ought to have been energy *in general*, as the oil companies do today.

We started work on *satellite communications* as early as 1969 in connection with a study of systems for *maritime* use. This has enabled Norway to take active part in the international negotiations and specifications concerning INMARSAT, which now is becoming a reality. As a result of our further studies Norway, as the first country in Western Europe, established in 1976 a national system for telecommunications via satellites between the *oil fields* in the North Sea and an earth station at Stavanger. The satellite transponder is rented from INTEL-SAT. We have carried out experiments as a basis for planning an extension of the system to *Svalbard* (Spitzbergen) and proven that this is feasible in spite of the high latitude 78°N. Small earth stations have been developed and installed at our building, Svalbard and five other places for propagation measurements of signals from ESA's Orbital Test Satellite OTS. Studies of the use of satellites *within the national network* are in progress, and show that we have to await future generations of satellites, which can work with smaller earth stations than the present ones, for this to be a viable solution. A group of engineers from Denmark, Finland, Norway and Sweden is now stationed in our Department for a joint study of a Nordic satellite system for *television broadcasting*.

Existing methods for finding the *optimum structure and dimensions* for both the local and the trunk networks are rather elaborate and timeconsuming. We have therefore developed a computer program for planning of analog local networks and are now proceeding with similar programs for digital local networks and the trunk network.

Studies of a nation-wide *network control and management system* have been the basis for an invitation for bids, which now are being evaluated. The system will make use of multiprocessors for an

integrated operational control of traffic, transmission and switching.

Our activities concerning *reliability* cover a wide range from detailed investigations of particular components in the existing systems to the establishment of an overall reliability plan for the future network. This work involves both laboratory measurements and theoretical studies. It is of great economic and qualitative importance to obtain an optimum allocation of reliability on the different parts of a network. We are therefore specifying well-defined and comparable reliability parameters for the various components.

*Traffic engineering* studies are in progress both for improving existing system and for planning new ones. Measuring methods for establishing the characteristics of telephone traffic have been studied, and the results are being used for obtaining a balanced dimensioning of the various organs in the switching systems.

Due to the steady increase in the *land mobile telephone service* both within the countries and across their borders, Denmark, Finland, Norway and Sweden decided in 1974 to jointly specify a new automatic system which gradually can replace their present manual systems. One of the requirements in the new system is that a mobile subscriber who has been allocated a number in his home area, shall be reached on this number irrespective of where in the four countries he is. We have contributed to this work by developing the complete system software, including that for the exchanges. The total investment of the system is divided between 5% for the radio base stations, 8% for the exchanges and 87% for the subscriber equipment. In order to ensure that suitable subscriber equipment will be available, we have also been engaged in working out its specifications and are closely following the industrial development.

A new standard *telephone apparatus* has just been developed and is undergoing field trials. It is of modern design for both desktop and wall, will be offered in different colors, supplied with push buttons and have very good telephonometric characteristics. Furthermore, various special features can be built in, such as loudspeaker, counter display, etc.

A new outdoor *telephone kiosk* is being developed, and much consideration is here given to the requirements of handicapped persons.

The Research & Development Department is

naturally also heavily engaged in many aspects of the *long-range planning*.

## **Conclusion**

The research & development activities in the Norwegian Telecommunications Administration

have passed through its first decennium, and the Research & Development Department has established itself as a well-respected *architect* and *catalyst*.

Our task is both challenging and interesting, because *the future has already started, and it is not what it used to be*.

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